March 1958 50¢

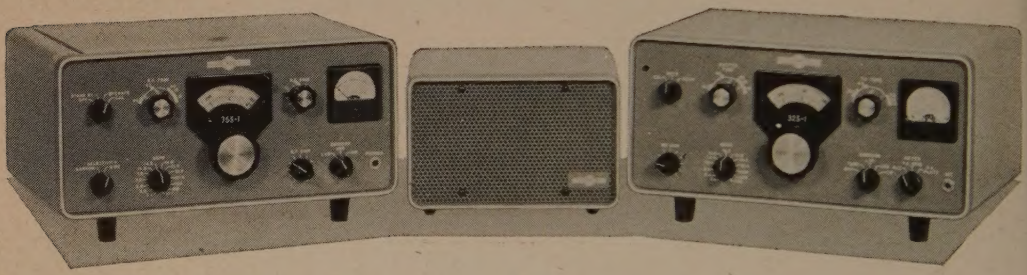
CQ

sideband

The Radio Amateur's Journal

First amateur station coordinated to operate as a transmitter-receiver or as a transceiver

Collins NEW complete SSB station



32S-1 TRANSMITTER	75S-1 RECEIVER
175 WATTS PEP INPUT	2.1 (furnished) AND .5 KC MECHANICAL FILTERS
80 THROUGH 10 METERS	BROAD POSITION FOR AM
10 DB RF FEEDBACK	CRYSTAL CALIBRATOR
AUTOMATIC LOAD CONTROL	UPPER & LOWER SSB, AM, CW
UPPER & LOWER SSB, CW	SENSITIVITY—1 uV FOR 10 DB S/N

Both units have the famous, stable Collins permeability-tuned VFO — Either operates separately, or, with the flip of a switch the station operates as a transceiver with the receiver VFO controlling —Each unit only 6⅞" high, 14½" wide, 11⅝" deep.

Available in September . . . For further information, see your Collins distributor — he is taking orders now . . . Transmitter only $555 (tentative) less power supply . . . Power supply $135 . . . Receiver only $495 (tentative) . . . *Coming soon* — maximum legal power linear amplifier for the 32S-1 . . . also 2 and 6 meter Mixer-Amplifier for 32S-1 and Converter for 75S-1.

The 32S-1 and 75S-1 will be on display at the New York IRE Convention in New York, March 24-27.

Collins CREATIVE LEADER IN COMMUNICATION COLLINS

Make your reservation now for the ANNUAL SINGLE SIDEBAND DINNER. March 25, 1958. Contact The SSB Amateur Radio Association, 261 Madison Avenue, New York 16, New York.

For further information, check number 1 on page 126.

CQ—The Radio Amateur's Journal

300 West 43rd Street, New York 36, N. Y.

March, 1958
vol. 14 no. 3

Departments

Branch Advertising Offices: James D. Summers, Suite 556, Pure Oil Building, 35 East Wacker Drive, Chicago 1, Ill. ANdover 3-1154.

Ted E. Schell, 2700 West 3rd Street, Los Angeles 57, Calif. DUnkirk 2-4889.

Charles W. Hoefer, 1664 Emerson Street, Palo Alto, Calif. DAvenport 4-2661.

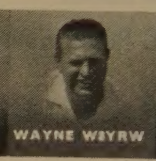
publisher S. R. Cowan
business manager David Saltman
production manager Charles W. Gardner, Jr.
circulation manager Harold Weisner
draftsman David Fish
advertising representative Jack N. Schneider
advertising representative R. A. Cowan
classified advertising Phyllis A. Gelfand

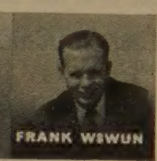
CQ — (title registered U.S. Post Office) is published monthly by Cowan Publishing Corporation. Executive and editorial offices at 300 West 43rd Street, New York 36, N. Y. Telephone JUdson 2-4460. Second Class Mail privileges authorized at New York, N. Y.

SUBSCRIPTION RATES: U.S.A. and Possessions, APO, FPO, Canada and Mexico: one year $4.00; two years $7.00; three years $10.00. Pan-American and foreign: one year $6.00; two years $11.00; three years $16.00.

FOREIGN SUBSCRIPTIONS: Great Britain: RSGB, New Ruskin House, Little Russell St.; London WC 1, England. Australia: Technical Book Co., 297 Swanston St., Melbourne C 1, Victoria, Australia.

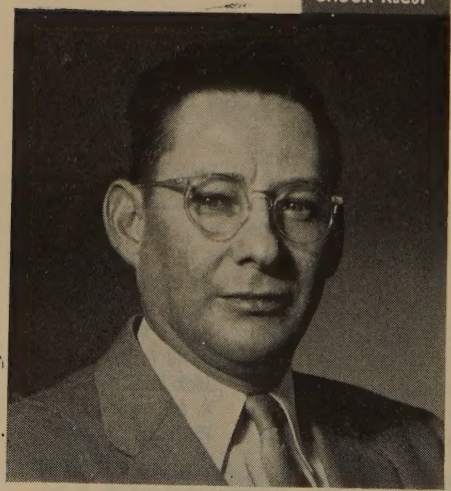
Postmaster: Send Form 3579 to CQ, 300 West 43rd Street, New York, N. Y.





All of these licensed radio amateurs make important contributions to the Heath line of fine ham kits. In a sense, they are your personal representatives within the company, because their design ideas and performance preferences reflect not only their own "on-the-air" experiences, but those of the amateur fraternity with which they are in constant contact. With this kind of representation in Benton Harbor, you can continue to rely on high-performance Heathkit amateur radio equipment designed by hams, for hams!

HEATH *hams work to bring you*



ROGER MACE (W8MWZ)
SENIOR HAM ENGINEER
HEATH COMPANY

HEATHKIT 50-WATT CW TRANSMITTER KIT

MODEL DX-20

$35.95

If high efficiency at low cost in a CW transmitter interests you you should be using a DX-20! It employs a single 6DQ6A tub in the final Amplifier stage for plate power input of 50 watts. The oscillator stage is a 6CL6, and the rectifier is a 5U4GB. Single knob band-switching is featured to cover 80, 40, 20, 15, 11 and 10 meters, and a pi network output circuit matches antenna impedances between 500 and 1000 ohms to reduce harmonic output. Designed for the novice as well as the advanced class CW operator. The transmitter is actually fun to build, even for a beginner, with complete step-by-step instructions and pictorial diagrams. All the parts are top-quality and well rated for their application. "Potted" transformers, copper-plated chassis, and ceramic switch insulation are typical. Mechanical and electrical construction is such that TVI problems are minimized. If you desire a good clean CW signal, this is the transmitter for you! Shpg. Wt. 18 lbs.

. . . de W2NSD

never say die

What About Eighty?

One of the big problems facing ham radio the coming international frequency conferce is our continuance on the lower frequencies. Let me elaborate.

In the past years the United States, being nsiderably ahead of most other countries, id pretty much its own way in the allocaons of frequencies. Large blocks of friendly untries backed us up in most of our deands. Today we find that these countries are r the most part disillusioned. They have by w developed their own communications sysms and have found that they have only a action of the frequencies available to them at they need. We won't, I'm sure, find them uite so willing to rubber stamp things next ear. They will be in there fighting for enough annels to handle the communications probm that has built up in their country, and the ck with anything like ham radio which is of tle value or interest to them.

For instance, what reasons could we sugest to Central and South American countries r the continuance of eighty meters as an nateur band? Only a handful of hams in ose countries use those bands, the bulk of e use being right here in the United States. is not likely that they will be much interested keeping these frequencies for amateur use hen they could use them very well for comercial and government communications.

And the U. S. could be put in a rough spot o. Suppose that several countries suggested swap with them getting eighty meters for mmercial use and the U. S. getting TV annel 1 (50 mc) for scatter use. Now, as u no doubt realize, the U. S. wants scatter equencies so bad they can almost taste them, aybe even worse than they want ham radio. re, ham radio is valuable for interesting ungsters in science, for providing a manwer pool for wartime, for scientific developents, and for emergency service, but "why uldn't they do all of this on the VHF's and HF's as well?"

Educated guesses now estimate that we will lose 160 meters, the lower 250 kc of 80 meters, the top 150 kc of 40 meters, the top 50 kc of 20 meters, and all or most of 6 meters. The prognosis may worsen as the preliminary talks develop.

What is needed, badly needed, is a good argument for our holding our lower frequency bands . . . some reason why the amateur's use of eighty meters will contribute more to the advancement of communications than our use of two meters.

Fresno

Don Chesser and I met for the first time at the Fresno annual DX Conference in January. We worked out, with the help of several of the top DXers, plans for improving our DX coverage. Some of these you will find discussed in this months DX Column, some will turn up as time goes on. The meeting was not only productive, but immensely enjoyable. We took off for a few hours one morning for a quick drive up to Yosemite. We visited with several local hams, and had a fine visit with John Guerero, KL7BNJ/KC4USN, who had just recently returned from wintering over at the South Pole station. John is the chap who set up the six meter station at the pole and built up the new final when the regular rig went West (or do things go North at the South Pole, since there is no West?).

Down in Los Angeles after the Conference I borrowed a two meter Communicator from Gonset and fired it up from my rented MGA. Since I was visiting W6LLP way up in the hills of Sierra Madre I managed to work out pretty well most of the time. Two meter activity was disappointing though, with most of my time taken up calling CQ and just listening. It sure was nothing like operating around New York City . . . not at all what I had expected. One high spot was a call from my old friend Ed Simmons, W6CLW. I turned around immediately and zeroed in on his shack where I found all sorts of goodies. Ed has been doing

a bit of facsimile work with both some We ern Union and some surplus equipment. also has Teletype machines all over the pla hooked up on every band. We called in on two meter RTTY net and said hello, cop some fool K2 on twenty, and decipher beedley beeps on forty. If you're interested facsimile why don't you drop Ed a note a prod him into writing about it?

Clubs

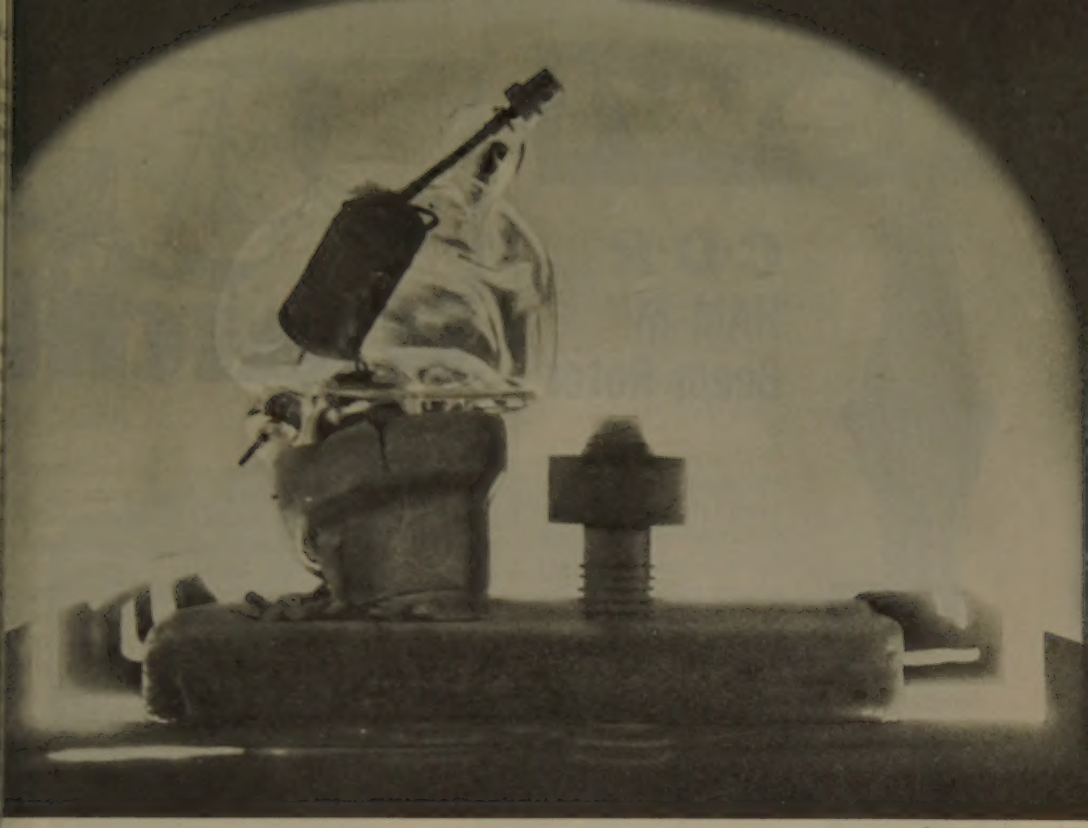
As I keep drumming into you, I am ava able now and then for a few thousand w chosen words to hold down attendance at cl meetings. If you have some skullduggery th you want to vote through when most of t members are staying away then put me dow on the program for the evening and settle ba for a coup. What I lack in personal drawi power I make up in a psychic ability to pr vide the "worst weather we've ever had" f your meeting. I managed recently to hold dow the attendance of the Pompton Lakes Rad Club to an all-time low by providing a blizza with about six inches of snow and slush. At t Inglewood (Cal.) club I brought a coup inches of rain and flooded streets. The Rad Club of Brooklyn had an untimely blizza last year for their trouble. The VHF Institu almost floated away when I came out to spea And so it goes. Somehow, no matter wh happens, I manage to get through to ta learnedly to the two or three brave souls th make it.

The Westchester (Cal.) Radio Club had n such problem since I dropped in unannounce Leo, W6KVY (ex-W1MLJ of Barre, Vt.) h dinnered me and suggested that we go arou the block to the meeting. There we fou W6GL demonstrating an RTTY setup to t club. I fought my way to the front and got half a hundred words and was about to sta selling subscriptions when the president g things back in hand and thrust some coff and doughnuts into my hands to shut me u Another calorie coup was a recent visit wi the Bell Labs group here in NYC, where was lunched.

Oh, yes. As I started out to say, if yo club has an open date you might get in touc with me . . . providing you are within 50 so miles of NYC. Might even be that K Grayson, W2HDM, our Surplus Editor wou be able to come too. He likes to drive h Porsche as well as I do mine, so we'll go mo anywhere. He's interesting too . . . maybe y don't even need me. My usual talk covers ho CQ works, our plans for the future, things w don't dare publish, anti-gravity, the secret b hind the flying saucers, etc., plus answers any embarassing questions you can ask.

As the forester said after chopping down long line of elms: "At last,

Seventy trees, Way



Surviving Heat Extremes
s an Eimac Ceramic Tube Extra

a high temperature furnace the difference be-een a ceramic tube and a glass tube is physically dent. But long before the glass tube reached the te of complete collapse shown above, it had be-ne useless as an electron tube.

Before the temperature reached the softening point glass, the envelope began giving off gaseous oducts that contaminated the tube's vacuum. The amic tube remained internally clean at tempera-es far exceeding the softening point of glass. The terials used in Eimac ceramic tubes are stable to re than 600° C.—the temperature at which Eimac ocesses these tubes.

Far below 600° C. the envelope of the glass tube had softened enough to allow the anode to move slightly to one side, radically disturbing the tube's electrode spacing. The electrodes of the ceramic tube were held rigidly in place by the highly heat resistant ceramic spacer rings and brazing alloys.

The 4CX300A used in this test is just one of a complete line of compact, high-performance ceramic tubes with exceptional resistance to damage by heat, shock and vibration. The performance-proved reliability of Eimac tubes assures you of more watt hours per dollar invested.

Write our Amateur Service Department for further information on Eimac ceramic tubes for amateur use

EITEL-McCULLOUGH, INC.
SAN BRUNO • CALIFORNIA

Eimac First with tubes that can take it

For further information, check number 8 on page 126.

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Negative Grid Tubes
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Feenix, Ar

Deer Hon. Ed:

Are you wanting to seeing the amchoors this country losing face? You wanting ho country to being disapointed in amchoors? A not not wanting amchoors to carrying gloryus herytage they having?

No needing to answering, Hon. Ed. Scratc are knowing how you feeling. Yes indeed amchoors coming first with you. One for a and all for one are your motto, I am surely.

If that being the case, then, howcomes yo Hon. Mag are not printing anything abouts th sityouayshun that are shortly going to be co fronting all amchoors. Not one line, not o word am I seeing about it in your Hon. Mag Hon. Ed? Howcomes? Howcomes indeed Huh??

Of coursely you knowing what I are speal ing about. What are amchoors going to doi when we having space travel? Have you fi youring out grate implicayshuns when we ha ing space travel?

Well, in case it slipping your Hon. Min Scratchi are riting this letter, on acct. I bee doing lotsa thinking on subject and maybe ca giving you some reel slicky hints on what having artickles on in your Hon. Mag.

Just for instants supposing expeydishun go to planut Joopiter and some amchoor wanti to handling traffick. He starts sending on trus old key and message goes winging its way 186,000 miles per second. You thinking me sage are getting there in winking of Hon. Ey lash? No indeedy. Joopiter are not so clo you can touching it. In fackly, when a farthest away, planut Joopiter are 600 meg miles away.

Just to saving you working your Hon. Sli Rule, that meening that message traveling f almost one hour before getting there. A samewise likewise message coming back a taking another hour, so you having plenty ti to starting cupple other QSO's.

But being carefool. Must knowing how f away are planut Joopiter. At closest point a only mere 367 megamiles away. So, if y going out to see movie between messages y missing message, on acct. it now going one-w in little over half an hour.

[*Continued on next page*]

RE'S YOUR CHANCE

to get a B&W transmitter that:

- Covers All Bands from 80-10 Meters
- Permits VFO or Crystal Control on All Frequencies
- Provides Versatility for AM, CW and SSB with the 51SB-B
- Features Built-in TVI Suppression
- Has Components Conservatively Rated for Maximum Output
- And . . . All at the Lowest Cost for Comparative Value

tified by FCDA
em No. T-32

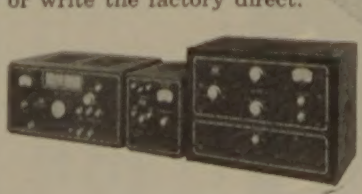
00-B $525

re isn't a transmitter on the market that gives more versatility than the B&W 5100-B . . . rdless of price. In spite of superb performance, 5100-B is as competitive in cost and often er many comparable units.

esigned for discriminating hams, the 5100-B ngineered to the highest degree by profession- Layout and circuitry are skillfully designed to re a minimum of harmonics and distortion. s a basic for novice or oldtimer the 5100-B erfect for future addition of SSB by plugging B&W 51SB-B. If you're ready for maximum er you can add the B&W L-1000-A Grounded Grid Linear Amplifier. This addition will give you 1000 watts peak envelope SSB-875 watts CW and 375 watts linear AM phone.

Here's your chance to get on the air with a top-quality signal. Buy a B&W Model 5100-B transmitter today. If you want additional information, before you buy, see your favorite "ham" dealer or write the factory direct.

Complete assembly 5100-B, 51SB-B and L-1000-A



Barker & Williamson, Inc.

Canal Street and Beaver Dam Road • Bristol, Penna.

For further information, check number 10 on page 126.

B&W AMATEUR EQUIPMENT: Transmitters AM - CW - SSB • Single Sideband Generators • Single Sideband Receiving Adapters • Dip Meters • Match rs • Frequency Multipliers • Low-Pass Filters • T-R Switches • R.F. Filament Chokes • Transmitting R.F. Plate Chokes • Audio Phase Shift Networks d Switching Pi-Networks • Cyclometer-type Counters • Antenna Co-axial Connectors • Baluns • Variable Capacitors • Fixed and Rotary Type Coils

SCRATCH! [*from page 12*]

On other hand, if expeydishun are going t planut Plooto, then you can taking in cupp double feetures and getting ate hours sleep t boot, on acct. Plooto are 25,000 megamile away, so by time you heering from them u there it taking forteen hours. That is, unles planut Plooto are close, in which case it takin only ate hours both ways.

How sumever, amchoor reely having t working hard to keeping track of Hon. Planu when he trying to talk to planut Mars. Whe farthest away—248 megamiles—it taking 4 minutes to getting message there and back, bu when it neerest—35 megamiles—it only takin six minutes, and this are hardly time to gettin desent smoke before traffick coming back an keeping you busy.

It are not that I feeling all this are happen ing tomorrow, Hon. Ed., but maybe it late than you think for Hon. Artickle on subject With Hon. Moon no trubble, natchyourally on acct. message going there and back i cupple seconds. But after the moon, what wil poor amchoor do?

Cupple things are worrying me. If I sendin message to planut Joopiter when expeydishu are listening, and it taking message one hou to getting there, maybe they not listening on hour later. On other hand, that meening tha I can sending message when they not listening and yet if they listening one hour later the heering it hunky-dory.

You understanding that? Good, on acct. not. If you understanding that, howsumever maybe you can answering me this questshun Spaceship are heding to planut Joopiter an are traveling at speed of light—same speed a radio wave. I sending message to spaceshi How can message ever catching up to space ship?

Don't telling me it not possible. Amchoor never admitting anything not possible. Whe are your first Hon. Artickle apeering in you Hon. Mag?

Respectively yours, Hashafisti Scratch

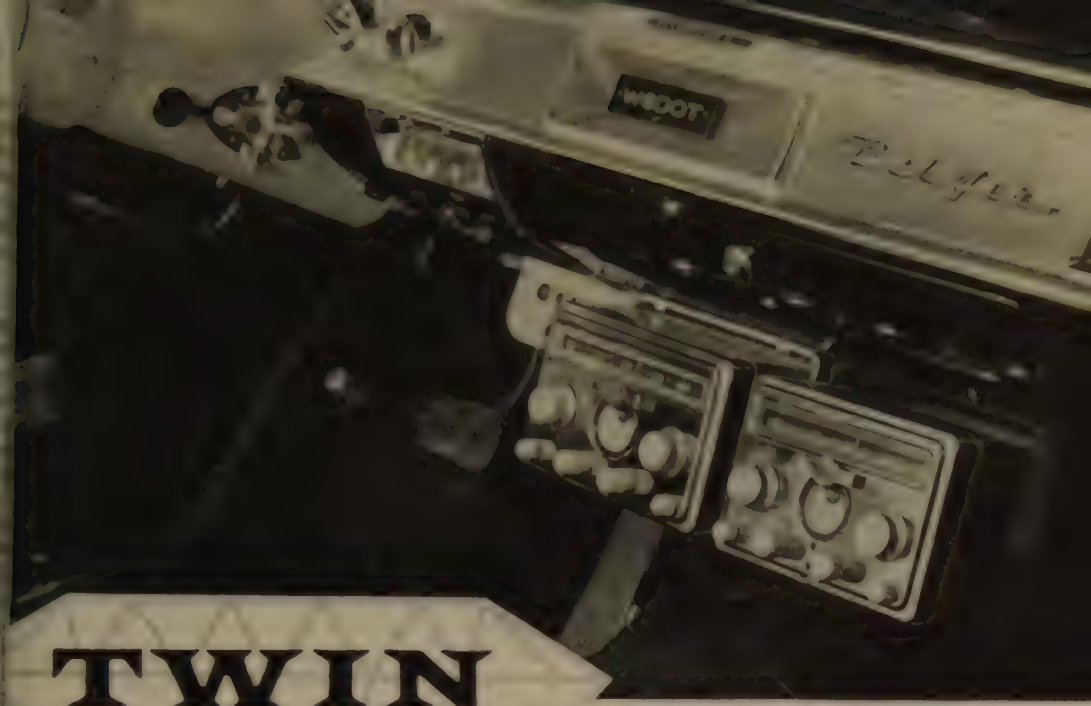
hamfest

Annual SSB Dinner

The Single Sideband Amateur Radio Asso ciation, Inc. (SSBARA) will sponsor th annual SSB dinner to be held in New Yor City on March 25th, 1958 in the Grand Bal room of the Hotel New Yorker. It's expecte to be the largest function of its kind to dat Accommodations for 900 guests have bee prepared.

Outstanding communications personaliti from the military, commercial and amateu ranks will be on hand. Talks by several wel known people will be included in the progra

Tickets are $7.50 each and can be obtaine by writing SSBARA, 261 Madison Ave., Ne York 16, New York.



TWIN "SPARKLERS"

G-66B RECEIVER . . . G-77A TRANSMITTER

Mobile-wise, don't be content with a slight lead . . . install this pair of sparklers and *go far out in front!*

G-66B . . . high sensitivity, stability, selectivity. Features include double conversion with crystal controlled first conversion oscillator, full-vision dial, complete band-spread, tuning meter. Squelch and noise limiter give big assist to mobile noise. Gives you superlative reception on standard broadcast and amateur 80, 40, 20, 15 and 10 meter bands. A *sparkler!*

G-77A . . . real power punch! 50-60 watts input fully modulated. Plenty of speech gain. Pi network output with 6146 amplifier. Excellent VFO with calibrated slide-rule dial. (Xtl optional.) Power supply and modulator in separate compact unit for convenient mounting. Unit covers amateur 80-40-20-15-10 meters. Now with universal power supply for 6-12V DC or 115V AC. *Another sparkler!*

GONSET

G-66B, less power supply . . . #3046 . . . . . 209.50

Universal "three-way" power supply/speaker unit. (6V-12V DC, 115V AC.) Factory wired 6V DC, 115V AC. With patch cable . . . . . #3098 . . . . . 49.50

"Thin pack" power supply. (12 volt DC only) less patch cable . . . #3098 . . . 29.50

G-77A, Transmitter with universal power supply, (6V-12V DC or 115 V AC) and installation kit . . . (Factory wired for 12V DC) 299.00

Further information, check number 12 on page 126.

GONSET DIVISION OF YOUNG SPRING & WIRE CORPORATION
BURBANK, CALIFORNIA

CLUB BULLETIN

Marvin D. Lipton, VE3DQX
311 Rosemary Road, Toronto 10, Ontario, Canada

Most amateur radio clubs on this continen regard a club paper as an "added attraction However the British Two Call Club is built en tirely around QTC, its club bulletin. The clu members are kept informed of club matter and vote through QTC, which has a circula tion of about 200. The club secretary, G. W Haylock, G2DHV, of London, England, edit the newsletter. The club was formed in 1950 t strengthen the friendship created among Ham that were sent overseas during W. W. II. Th club paper, which is published quarterly, serve to renew old acquaintances every 3 months QTC is one of the more remote members o the CQ news service.

To date, the Club Bulletin Department o CQ sends its monthly news release, CQ NEWS to 62 members. This department is a relativel new member of the CQ family. Members o one family usually have no secrets amongs themselves and likewise CQ Magazine plans t let the affiliated club papers in on a secret Every month CQ will give the members of it news service a sneak preview of the nex month's magazine. This info will be sent t associated editors via CQ NEWS. Club editor may then share this "inside information" wit their readers. Here is one more reason why yo should ask your club to join us if they haven' already.

Sorry we have not got space for our mem bership list this month, but look for it in Apri along with the story of a thriving Midwes amateur radio club publication; the PRAIRI DOG'Ssss BARKS.

73, Marv, VE3DQ

ARMY MARS TALKS

First Army Mars SSB Technical Net

Monday evenings, 9-11 PM EST,
4030 kc upper sideband

March 3—"Radioteletype for the Radio Amateur" by Al. MacDonald, Transmitter Supervisor, WABD, DuMont Television Network.

March 10—"Electronics for High Energy Particle Acceleration" by Martin Plotkin, Electronics Engineer, Brookhaven National Lab.

March 17—"Cuba to Florida Over the Horizon TV Microwave Link" by Julian Gulack, Project Engineer, Federal Telecommunications Lab.

March 24—"Panoramic Receivers for Spectrum Surveillance" by Nat Cohen, Senior Project Engineer, Radio Receptor Co.

March 31—"Travelling Wave Tubes & Associated Microwave Devices" by Dan George, Advanced Research Engineer, Sylvania Electric Products Co.

Two exciting new linear amplifiers

VIKING "COURIER"

Rated a solid one-half kilowatt P.E.P. input with auxiliary SSB exciter as a Class B linear amplifier; one-half kilowatt input CW or 200 watts in AM linear mode. Completely self-contained desk-top package—may be driven by the Viking "Navigator," "Ranger," "Pacemaker," or other unit of comparable output. Continuous coverage 3.5 to 30 mcs. Drive requirements: 5 to 35 watts depending upon mode and frequency desired. Pi-network output designed to match 40 to 600 ohm antenna loads. Fully TVI suppressed. Complete with tubes and built-in power supply.

Cat. No.		Amateur Net
240-352-1	Kit	$244.50
240-352-2	Wired and tested	$289.50

VIKING "THUNDERBOLT"

The hottest linear amplifier on the market—2000 watts P.E.P.* input SSB; 1000 watts CW; 800 watts AM linear; in a completely self-contained desk-top package. Continuous coverage 3.5 to 30 mcs.—instant bandswitching. May be driven by the Viking "Navigator," "Ranger," "Pacemaker," or other unit of comparable output. Drive requirements: approximately 10 watts in Class AB_2 linear, 20 watts Class C continuous wave. With tubes and built-in power supply.

Cat. No.		Amateur Net
240-353-1	Kit	$524.50
240-353-2	Wired and tested	$589.50

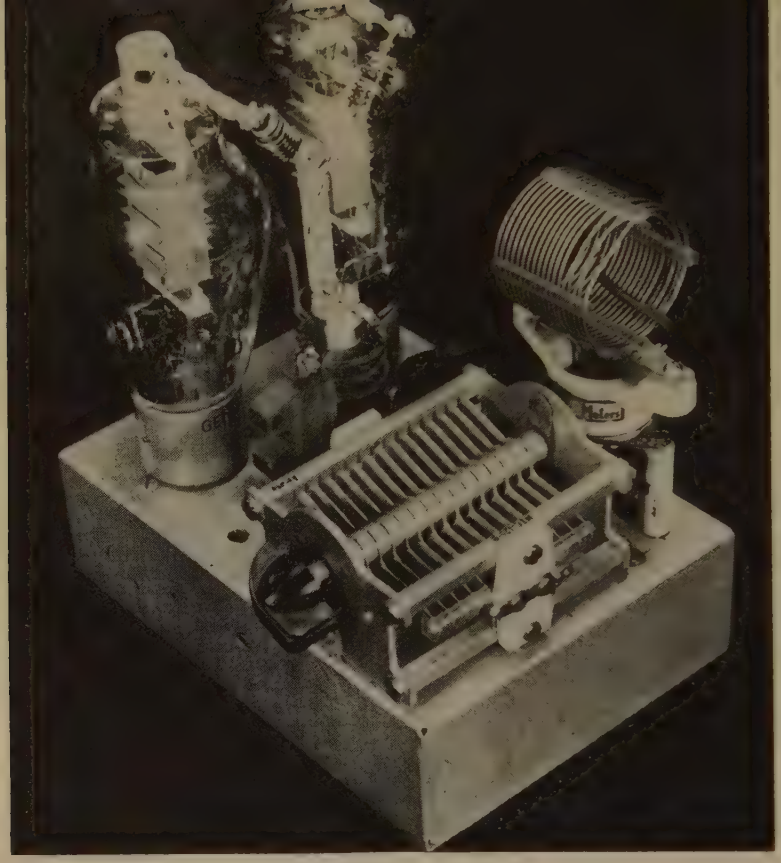
Drive them with the "Pacemaker"

This exciting transmitter offers you the ultimate in single sideband . . . 90 watts SSB P.E.P. and CW input . . . 35 watts AM. Self-contained—effectively TVI suppressed. Instant bandswitching on 80, 40, 20, 15, and 10 meters. Excellent stability and suppression. Temperature compensated built-in VFO . . . separate crystal control provided for each band. VOX and anti-trip circuits provide excellent voice controlled operation. Pi-network output matches antenna loads from 50 to 600 ohms. More than enough power to drive the Viking Kilowatt or grounded-grid kilowatt amplifiers. (Requires Cat. No. 250-34 Power Divider with Viking Kilowatt.) With tubes and crystals, less key and microphone.

Cat. No.		Amateur Net
240-301-2	Wired and tested	$495.00

POWER DIVIDER—Provides up to 35 watts continuous dissipation. Designed to provide the proper output loading of the "Pacemaker" SSB Transmitter when used to drive the Viking Kilowatt Amplifier.
Cat. No. 250-34 . . . . . Amateur Net $25.50

For further information, check number 23 on page 126



An Economical Half-Gallon Linear

by HOWARD L. SMITH, W6COU
5532 East National Avenue, Fresno, Calif.

The linear R-F amplifier about to be described is not the finest amplifier in the world. There are no new principals envolved. It is not spectacular. In fact, in the form presented here, it is not even designed to handle the legal kilowatt limit. However, it is doubtful if you could find a linear capable of handling in the neighborhood of a half kilowatt (SSB, DSB, or CW) as simply and as economically as this arrangement. The popular 811A tubes used probably offer more plate dissipation watts per dollar than any other tube. In addition, no expensive sockets are required. No blowers are necessary. Only two supplies are required: filament and plate.

After the amplifier was placed in operation at W6COU, the author began receiving requests for the dope on the device. This was slightly amazing at first since, as mentioned before, nothing new had been invented. Apparently, however, the big attraction was the economical efficiency. Evidently a great many of us are still interested in getting the most output per dollar input.

As may be seen in fig 1, a pair of 811A tubes are used in a grounded-grid circuit. It will be noticed right off the bat that the secret of the simplicity is the filament choke. A year or so ago this amplifier would not have been so simple and easy to come by. The commercial type filament choke is a wonderful invention and makes everything just fine and dandy, not only for this but for just about any other kind of grounded-grid amplifier you might desire.

The input signal is fed through C1 to the filaments of the 811A's which are kept above ground for rf by means of RFC1. Capacitor C1 is necessary merely to prevent short-circuiting the filament to ground through the output

coil of the driver. If the driver has a series capacitor in the output C1 will not be necessary. Capacitor C2 is used to keep both sides of the filaments at the same rf potential. Capacitors C3 and C4 are used to keep the "cold" end of the filament choke more or less firmly tied down to ground for rf. None of these capacitors are critical as to value.

Parasitic suppressors R1 and R2 were found advisable to prevent a slight tendency toward instability on the 10- and 15-meter bands.

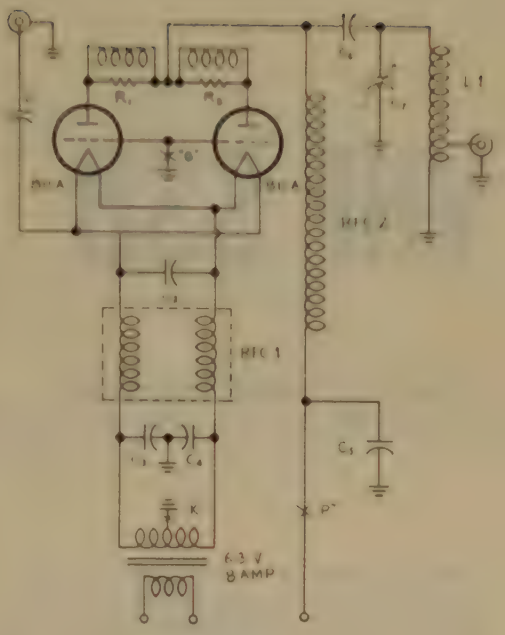
The plate choke, RFC2, must be suitable for use over the range of frequencies to be used and must, of course, be capable of handling the plate current. The cold end of this choke is tied to ground by means of C5, whose exact value is not critical but must have a working voltage rating well over the value of the plate supply potential, preferably at least twice as much.

The exact capacity of C6 is not critical, its purpose being to block the dc plate voltage from the output circuit, while at the same time offering a low impedance to rf. This capacitor should have a working voltage rating of at least two or three times the value of the plate voltage.

The plate circuit (C7-L1) is the conventional parallel-tuned circuit. The approximate values of C and L are given in Table I. These values are based upon a plate voltage of 1250, plate current of 350 ma., and a Q of 12. The loading is adjusted by varying the position of the tap on L1.

If operation is to be confined to one or two bands, the plate tank circuit shown should be quite adequate. Plug-in coils may be used. However, if so-called all-band operation is desired a PI-net arrangement in the output would be preferable since it is more adaptable to band-switching. For this the reader is referred to a recent article by W6GEG/3.[4]

Metering may be accomplished in different ways. Plate current may be read by breaking the lead at point "P" and inserting a milliameter. An alternative is to break the lead at



Schematic diagram

point "K" and insert the milliameter. This latter point will, however, indicate the sum of the plate and grid currents. Grid current alone may be read by inserting a milliameter between the 811A grids and ground at point "G". If this is done, the grids should be grounded for rf, preferably at the sockets, through .01 mfd ceramics.

The amount of power that can be run to this amplifier will depend upon the driving power available. Single-sideband exciters such as the Pacemaker, the HT-30 or HT-32 will drive it to the full safe input of approximately a half KW. The author has found that the Central Electronics 20A exciter will drive it to about 250 watts on the lower frequency bands and about 150 watts on the higher frequency bands. The addition of a driver such as a single 837 in grounded-grid in between the 20A and the amplifier should enable operation at four or five hundred watts input. Indications are that it requires 30 to 40 watts peak power to drive the amplifier to its full capabilities.

The proper tuning and loading for a linear amplifier has been discussed in a number of excellent articles so no attempt will be made here to go into this phase. However, some important points might be mentioned. Tuning of the plate circuit may be done by the usual dip method, although a much better method is to use a field-strength meter or rf ammeter in the transmission line in conjunction with the plate meter. One very important point to remembers is to keep the amplifier heavily loaded to avoid limiting, although not to the extent

[4] "Simplified Loading of PI Coupled Amplifiers," by Norman R. McLaughlin; CQ, April, 1957

[*Continued on page 106*]

VHF SSB

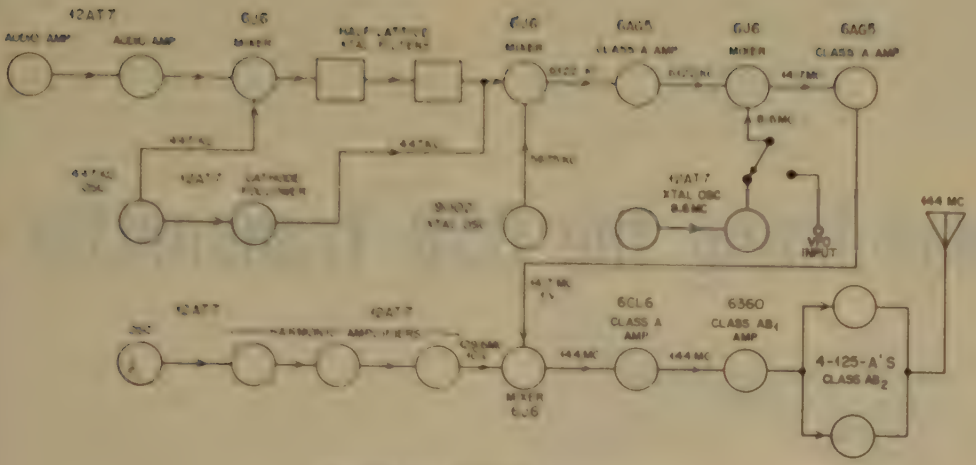
by CWO JACK DRUMMOND, W3YHI/DL4WW
First Radio Relay Squadron, APO 12, New York, N. Y.

Why use SSB on the VHF bands? That appears to be the key question to this subject. The next logical question might well be "how do you do it?" I'm going to attempt to cover those aspects for you this evening. Incidentally, I don't own stock in any SSB manufacturing concerns so if my own enthusiasm carries me away, please blame me and not industry. I'm "sold" on it.

As to the first question, "why use SSB on VHF," let me begin by giving you an idea of my own experiences with it on 2 meters. In April of 1956 I started keeping schedules 4 nights per week with W2JJC in New Market, N. J. that was about 190 miles airline distance. At that time, Arnie was running 400 watts of SSB and was the only station that I had then heard using SSB on 2 meters. I was then running 120 watts into my old reliable 829B on AM and CW. I had gained a healthy respect for my 829 rig as I had used it both in Europe to run up contacts with Germany, France, Belgium, Holland, Switzerland, Austria, England and here at Washington for contacts with 19 states plus Canada and Nova Scotia. But, it just couldn't "cut the mustard" for day in-day out contacts with W2JJC. I soon found that I was using CW more often than fone in order to get through. At the same time, W2JJC was constantly dangling a nice fone signal under my nose by using SSB. This finally got under my skin, so I built my own rig for SSB in July 1956.

I had not previously played with SSB and wanted to find out for myself about the so-called advantages of SSB over AM. With that in mind, I designed my SSB rig to use the same final amplifier tube (829B) working at the same plate voltage (500) and to operate on the same frequency using the same microphone and antenna. I frequently switched transmitters during QSO's to compare the "talk power" of the SSB rig against both the AM and CW from the old rig. I measured the average output power of the SSB rig at 41 watts. How did it stack up? My old CW-AM rig has been gathering dust ever since. I now use it only for ballast to hold my rack solidly on the floor. I found that if my CW could be copied, my SSB could also be copied. Why pound away on the "idiot stick" with CW when you can do the job quicker and more pleasantly with fone via SSB? I have since raised my power level a bit by replacing the 829 with a pair of 4-125A's.

I completed more than 190 QSO's with W2JJC without a single case in which we could not carry on the contact. During the winter of 1956 I carried on similar tests with W4SOP in Burlington, N. C., at about 250 miles with the 829B on SSB. The results were the same although the signals were down in the noise at times. We found it possible to carry on QSO's when the signals were so weak that the receiver "S" meter refused to move except on noise pulses. The next question then was "what would happen during aurora?" By that time, SSB was booming on 2 meters. There were 4 of us using it—W2JJC, W3HWN, W4SOP and myself. It took a bit of doing but finally the chance arrived by one of those rare and unplanned coincidences. I heard W2JJC and W3HWN make a test via aurora and copied both of them. I was able to break in on that for a 3 way QSO via aurora. W4SOP told me later that he had copied all 3 of us. That may well have been another "first night" in amateur history. You *can* work on fone during aurora by using SSB. In all fairness, however, I must say that it doesn't always work—not on 2 meters at least. The frequency shift effect of aurora propogation is a variable factor. SSB doesn't like frequency shifting. The sound of SSB via aurora is truly peculiar and has been described as a severe case of laryngitis eminating from the bottom of a pickle barrel. I recently had the pleasure of



500 watt SSB transmitter for 144 mc.

proving to W9EGH in Goshen, Indiana, that it does work. His remark was typical, "I didn't think it could be done."

Some of you may not be too well versed on SSB. Let me take just a moment to touch on a few points about it. You can copy SSB on a conventional receiver if that receiver is reasonably stable. I used a battered old BC-779 running barefooted and had very good luck with it. You *can* get both AM and CW out of your SSB transmitter. How? Simply, twist a knob and reinsert the suppressed carrier. When the carrier is reinserted, you'll have AM with only one sideband. You can key that carrier for CW. So, in passing, the SSB transmitter does not tie you down to suppressed carrier operation unless you so elect. I reinsert carrier on those occasions when the other fellow's receiver can't handle SSBSC, and occasionally for CW. In all fairness I must point out that the ratio of contacts per call was low when I first went over to SSB operation. No one was using SSB in the area and some fellows thought my AM transmitter had gone wild due to the strange sounds they were hearing.

How about TVI? I didn't have it on AM and I don't have it on SSB. Both rigs were built "clean." By running the SSB rig with Class AB1 amplifiers with no grid current, you can eliminate TVI caused by grid rectification. You also have the sneaky advantage that even if someone might hear the signal on their TV receiver, they won't be able to read it!

In summing up why I prefer SSB for VHF, here are what I have found the advantages to be:

a. It is more economical of the power consumed. No power is wasted on a carrier that doesn't convey intelligence and that represents 50% of an AM signal.

b. No power is required for high level modulators. I use only one audio tube and have no investment in back and pocket book breaking speech amplifier and modulation equipment.

c. All of the signal put into the antenna is "talk power," and it's all packed into one sideband. The other sideband isn't necessary.

d. The old familiar VHF story "I can hear your signal, but it's too weak to copy" is gone for me. With SSB, I *can* be copied if my signal can be heard. How many times have you said or heard "I hear a lot of weak fone signals but can't identify them?" SSB would eliminate that.

e. My communications range has been greatly extended for weak signal fone work.

f. I can work as well on SSB fone as on CW for weak signal work.

Now for the second and last major question, "how do you do it?" SSB appears mysterious primarily only because it still isn't generally understood. There are no special tricks needed to get it into the VHF spectrum. Virtually nothing has been printed on the VHF application of SSB, but it really isn't needed. I'll go over a few basic points of SSB techniques for you. Bear in mind that they are true for all frequencies, including VHF.

You cannot multiply frequencies when using SSB. Why? You would multiply the modulation frequencies at the same time. The resulting signal would sound somewhat other than desirable. If you have a SSB signal on 75 meters and you want to put it on 20 meters, you do it by hetrodyning. This is exactly the same basic technique used in the super-hetrodyne receiver. If you have SSB on one of the "low frequency" bands and want to put it on VHF, you simply beat, or hetrodyne, the SSB signal against another signal to produce a third signal at the desired frequency. For example: a signal at 14 mc can be hetrodyned

[*Continued on page 116*]

Modulating the DSB Transmitter

by JOHN WEBB, K2GZT (ex WØAHM)
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Light Military Electronic Equipment Department
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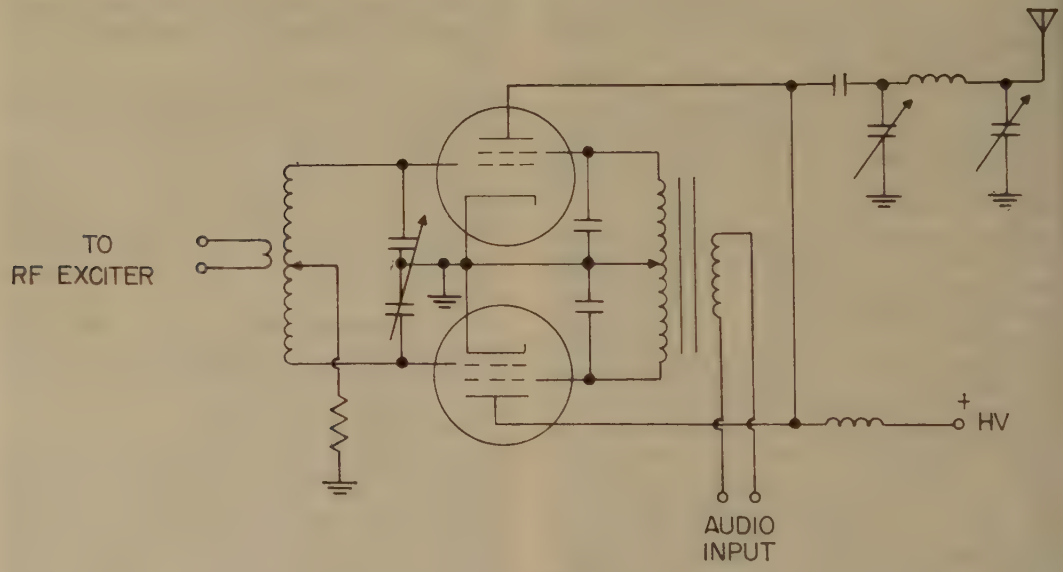


Fig. 1—Schematic diagram of high level modulated DSB transmitter.

With the increasing popularity of double-sideband operation on the amateur bands there appears to be a need for some information as to how to obtain optimum performance from the DSB transmitter. Most operators who have tried DSB have found that it has a few features which make it more desirable than either AM or SSB. It suppresses the carrier; has inherent diversity; is much simpler to build and operate than SSB; allows greater intelligence power output from the transmitter; and, when received on a synchronous detection receiver[1], it is a genuine pleasure to use.

There are two convenient methods of converting to a DSB transmitter. One method involves DSB operation of phasing type exciters in existing single-sideband stations. This is easily accomplished with the Central Electronics' exciters, and other similar equipment, by operating in the AM mode with the carrier suppressed by the CARRIER BALANCE control. The second, and least expensive method, is the high level balanced modulator circuit described by W2CRR[2]. A schematic diagram of the transmitter circuit is shown as fig 1. The circuit utilizes two screen-grid tubes driven in push-pull with the plates connected in parallel. The audio is supplied in push-pull to

e screens. The chief advantage of this method its ease of adjustment which is a result of simplicity.

It will be found that proper adjustment is as important in the DSB transmitter as in the SSB transmitter. Correct adjustment of a DSB transmitter of either type can be indicated with a single audio tone and an oscilloscope. Only one tone is required in order to get the familiar "two-tone" test pattern since two sidebands are generated.

A single tone envelope for the DSB transmitter is shown in fig 2. It can be seen that the pattern is identical to the two-tone equal amplitude test envelope in the SSB transmitter. As with SSB, the drive and final amplifier loading are adjusted to give the highest power output consistent with linearity. The "Bowtie" pattern presents a more convenient method of indicating alignment of the DSB transmitter. The bowtie corresponds closely to the trapezoidal pattern used in the adjustment of AM transmitters and is obtained with the same oscilloscope connections. Audio is fed to the horizontal plates and double sideband rf output is fed to the vertical plates. Fig 3 is the pattern that will be obtained with a well adjusted DSB transmitter. Fig 4 shows some of the patterns indicating incorrect transmitter adjustment.

Fig 4a indicates either that the coupling on the final amplifier should be increased or that the audio driving voltage should be reduced. Fig 4b is what will be seen if tubes which need screen bias are operated with too much bias voltage. Fig 4c shows the effect of unbalance in the balanced modulator.

Note the "one-tone" test picture in fig 2. A most likely observation is that the envelope is not filled, or that the average power is less than the peak power. In fact the average power is one-half the peak power. This means that if a tone modulated DSB transmitter was measured as delivering 100 watts of average power to the antenna, the peak power would be 200 watts. This fact may be used to a great advantage if speech clipping is employed. When the peaks of an audio waveform are clipped, the effect is to raise the average power. The clipped speech is passed through a lowpass audio filter to suppress the higher order harmonics, or "splatter," generated in the clipping process. In effect, if the DSB transmitter is modulated with clipped speech it is modulated with square waves. Fig 5 is the DSB envelope displayed on an oscilloscope with a clipped sine wave as a modulating voltage. It is seen that the envelope has nearly constant amplitude or that the peak and average powers are nearly equal. It can be con-

J. K. Webb, "A Synchronous Detection Adapter for Communications Receivers", *CQ*, June 1957

J. P. Costas, "Single Sideband: Is It Really Better Than Amplitude Modulation", *CQ*, January 1957

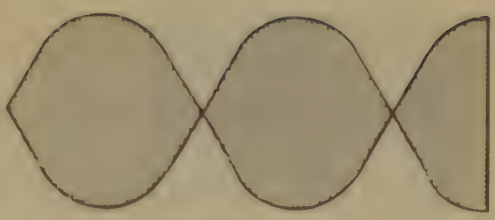
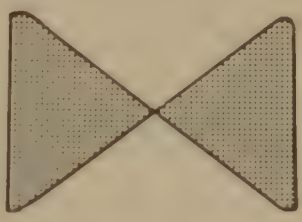


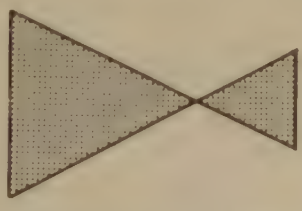
Fig 2—Oscilloscope pattern showing envelope of a single tone modulated DSB transmitter.

Fig. 3—Bowtie scope pattern obtained with properly adjusted DSB transmitter.

a—Output load impedance too high, or too much audio drive.



b—Excessive bias on screens.



c—Balanced modulator not balanced.

Fig. 4—Bowtie patterns indicating improper adjustment of DSB transmitter.

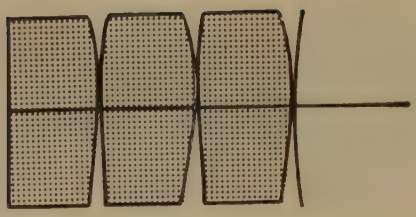


Fig. 5—Oscilloscope pattern showing envelope of a DSB transmitter operating with clipped speech.

cluded that it is highly advantageous to use speech clipping in the DSB transmitter in order to increase the average power output.

This technique is not new as AM operators have used clipped speech very effectively for years. Remember, as W2CRR pointed out, speech clipping cannot be used effectively with single sideband transmitters without greatly complicating their design. Another advantage that accrues is that the DSB transmitter power supply need not have dynamic regulation as good as that required by SSB transmitters since the envelope is of more constant amplitude when speech clipping is used.

Since clipping and filtering are so important, a simple filter-clipper circuit is presented here. It is designed to be inserted into existing speech amplifiers. Two precautions must be observed in its use:

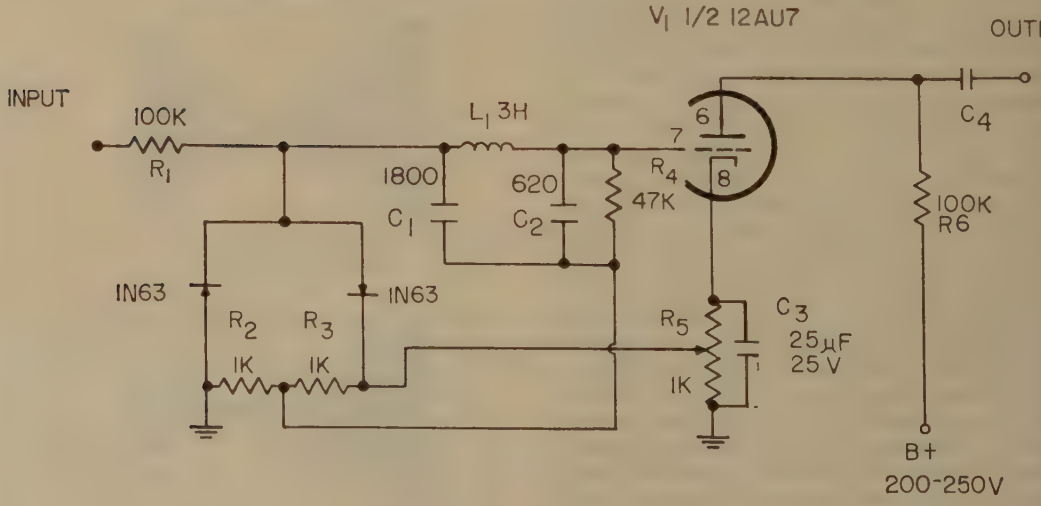
(1) The low frequency response of following stages must be good. RC time constants of couplings should not be less than .005 sec. For this reason, tl clipper should not precede the existir pre-amplifier stages as their couplin are not usually this good.

(2) When the clipper filter is included SSB/DSB exciters, it must be disable in the SSB mode of operation.

Fig 6 is a schematic diagram of the filte clipper circuit. The clipping function is accon plished by the two diodes which are biase beyond cut-off by the positive voltage obtaine from R5. When the peak input voltage exceed the bias voltage on either diode, the peak vol age is limited to the bias value. The filter, con sisting of C1, C2, and L1, is a low-pass filte with a cut-off frequency of about 3000 cycles A 10 Henry smoothing choke may be use for L1 if C1 and C2 are 470 mmfd and 33 mmfd, respectively. Either filter combinatio has nearly the same response, and about 10 d down at 4000 cps. The circuit has about unity gain when the clipping is adjusted to 1 db and requires from .5 to 2 volts rms drivin voltage from a high impedance source. Th best place to install it is after the existin audio gain control. R5 then becomes the ou put level control and the existing gain contro adjusts the amount of clipping. A 6AL5 dua diode will work just as well as the 1N6 diodes if it is preferred.

The information presented here should hel in obtaining optimum perfomance from DSB transmitter. The DSB transmitter wi allow a much needed modernization of amateu bands with equipment that everyone ca afford.

Fig. 6—Schematic diagram of speech clipper filter for installation in existing speech amplifier circuits.



ALL COMPONENTS ARE 10% TOLERANCE.
ALL RESISTORS ARE 1/2 WATT.
L_1 IS THE 3H POWER SUPPLY FILTER CHOKE FOUND IN ARC-5 RECEIVERS.

Publicity for Your Club — Free!"

arles H. Curran, W1FIG

Newspapers receive and print many "free" ns. These are called free because the club individuals sending in these news items are paid or charged. Your Ham club can take antage of this practice to get some free blicity.

The Rub

This free publicity is not as easy to get it may seem. Of the total material sent in a newspaper, only a small percentage ever cast into print. This article seeks to help increase your chances of having your b's news printed.

Here's How

. Interest. The main commodity of a news-per is news. That's what it sells. Therefore, publicity release you send in should con-some newsworthy fact. Among the pos-e stories that may interest the readers of aper are: CD news, emergency communica-ns drills (Field days etc.), elections, awards de to members, and speakers scheduled for etings. Any event to which the general blic is invited is always a good story.

2. Style. The newsworthy fact should al-ys be contained in the first sentence of the ry. This is called the *lead*, and contains the ssic five Ws: Who, What, When, Where, l Why. For example, if your club has an ction, the story you send to the paper uld begin:

"Four Podunk men (or local men-keep the erest local) were elected officers of the dunk Amateur Radio club here last night."

The next paragraph should identify the men name, age, and street address. Call letters y be included, but will not interest the lay der, and may prove harmful (TVI, you ow).

n following paragraphs, you can tell the der a little bit about the club, in terms of t which will interest him: e.g. CD, Emer-cy activities, etc.

A good news story is written like an inverted pyramid. That is, the prime interest comes at the top, the opening lines, of the column. Other information follows in order of its importance. This is done because surveys have shown that the average reader reads only the first few lines of a story to see if it will interest him. If something in those opening lines doesn't catch his eye, he's not going any farther into it.

Unless a person is known to nearly everyone in the community, his name should never begin the story.

Bad: John F. Jameson, 24, of 1985 Elm St., (reader reaction: "Ho-hum, who's he?" turns page, reads something else).

Good: A local amateur radio operator has been nominated to receive a national award for his work in relaying messages to and from servicemen at the North Pole.

(Second paragraph) The nominee, John F. Jameson, 24, etc.

Every newspaper has its style rules. These have mainly to do with such matters as abbreviations and capitalization. Do they write, street, st., St., or Str.? Do they abbreviate Pennsylvania as Pa., Penn., or Penna.? These may seem minor, but it will help your chances of having a story printed if you follow the style of the paper, for all good-sized newspapers have a copy desk which examines every story and corrects errors, spelling, *and* makes the story conform to the paper's style.

I know of one paper which files all material received from a particular organization in the waste-basket, for they have seen from experience that copy from this source contains so many deviations from their style that it costs them more than the story is worth to correct them.

It may be possible to obtain a copy of your newspaper's *Stylebook*, containing its rules for abbreviations, etc. This will, of course be a great aid. If you cannot get a copy, you can learn the paper's style by observation simply by reading a typical issue.

A word now on the use of technical terms. Use them as if it cost you a quart of blood for each one. The ordinary reader will not know what a 16 element beam is, nor will he

[*Continued on page 108*]

The New Look In DC—DC Power Conversion

by E. H. SOMMERFIELD, W2UQB
Endicott, N. Y.

With great advances being made in the fields of semiconductors and magnetics, there is good reason to believe that we will finally see the end of the Electro-Mechanical method of dc to dc conversion.

This article is not intended as a detailed theoretical analysis, but rather to acquaint the average ham with the potentialities of this type of circuit.

There are two new concepts not normally associated with power conversion in the explanation to follow; transistor and magnetic. It will be easier to understand if more detailed step by step analogy is made in a comparison to the familiar vibrator supply.

We are all familiar with the basic vibrator method of changing dc to pulsating dc and then stepping up the voltage *(Fig 1)*.

The first step is to substitute power transistors for the vibrator contacts as in *Fig 2*.

(Note vibrator contacts dotted in.) In this application, it is also necessary to connect both collectors together since they must be physically attached to the chassis for heat dissipation purposes. At present, disregard the base return circuits. They will be explained later in this article.

If we now apply a negative square wave alternately between a—b and d—e respectively, then points a—c and d—f respectively will appear alternately as approximate short circuits (less than 0.1 ohms in most cases). This action will produce pulsating dc similar to a vibrator.

The next step is to supply this alternate square wave to the base circuits in the proper phase. It will be simpler if we look at each half separately *(Fig 3)*. The dot indicates points of instantaneous in-phase polarity.

Under basic transformer action, the electron flow and polarity relationships of *Fig 3* result. Proper operation of this circuit demands that the transistors be operated under saturated conditions for two reasons:

1. Maximum voltage across primary of transformer is obtained.

2. Minimum voltage drop and dissipation across the transistor.

This last statement, as shown by *Fig 4*, very important, as it is the limitation of e ternal loading.

The transformer core is manufactured winding many wraps of ½" x 1 mil Deltam Ribbon into a torroidal form having no gap. It is a commercially available item. The are other factors involved, but basically t approximate expressions for frequency of o eration and voltage output are:

$$f = \frac{(\text{Supply} - 0.8)\ \text{Volts}}{4 \times a \times N \times B_s \times 10^{-8}}$$

$$E\ (\text{output}) = E\ (\text{Supply} - 0.8\ \frac{N\ (\text{Sec.})}{N\ (\text{Pri.})}$$

This is not an exact expression due to vari tions in core material and area. It may be use however, to put you in the ball park. "a" = co area in cm^2 as specified by the manufacture B_S = saturation flux density, also as specified the manufacturer, nominally 15 Kilogauss f Deltamax. N = number of turns of the p mary winding.

An experimental circuit *(Fig 5)* was co structed to demonstrate the advantages of t mode of dc-dc power conversion. With 6 vo input at 8.0 amperes, 400 volts output at 1 milliamperes was obtained. This is 83 per ce efficiency. Note that a bridge rather than voltage double rectifier was used. This is so each transistor works into the same load. and R_2 provide self-starting bias, and also p vide a Thevenin equivalent series base curre limiting resistance. C_1 and R_3 serve as spi eliminators by slowing the switching acti slightly. They are similar to buffering co ponents in a vibrator supply. With 12 vo input at 8.0 amperes, 400 volts at 210 mi amperes output could be obtained, at 90 p cent efficiency. There is a slight additional co per loss at 12 volts since the primary tu must be doubled. Note that this circuit comes more efficient as the input voltage raised because the voltage drop across transistor becomes a lower percentage of input voltage. This experimental model v designed to operate in the neighborhood

000) cycles, well below the cutoff frequency 4 or 5 kc, usually found in power transistors the common emitter configuration. This is common emitter configuration since the base turn is to the emitter through a low resist ce. At 1,000 cycles, using a full wave bridge ctifier, filtering is easily accomplished with single 12 mfd electrolytic condenser.

Construction Details

The collector dissipation $W_c = V_{ce} \times I_c$, here V_{ce} = the voltage from collector to mitter, and I_c = the collector current. This ltage is limited because its dissipation raises e junction temperature above the maximum te ratings published by the manufacturer. he junction temperature $T_j = T_m + (W_c \times$), where T_m = the temperature of the mount- g base, W_c = the collector dissipation in atts, and T_g = the thermal gradient in de- rees per watt. Both T_m and T_j are measured Centigrade. For the 2N277, T_j = 95 de- rees, and T_g = 1.2 degrees watt. The expres- on for junction temperature illustrates the ed for means to reduce the mounting base mperature T_m, since the lower T_m becomes, e higher W_c, the collector dissipation, can be. y mounting the transistors on a 6" x 6" x ¼" uminum plate called a "heat sink", T_m can be duced by conduction. For the heat sink to be fficient, its surface area must be large enough dissipate the heat without undue tempera- re rise. Usually ¼" aluminum is used since has sufficient thickness and conductivity to stribute the heat throughout its area. In addi- on, fins constructed from aluminum angle ock were added to increase the surface area. is important, when mounting the transistors nd angle stock to the heat sink, to make sure at both surfaces are clean so that contact is ade over the entire mounting surface.

The application of silicone grease between he transistor and the heat sink will assure hermal contact over the entire transistor heat ink area.

In conclusion, I would like to state that there re those of us, and I hope that our ranks are eadily increasing, who enjoy improving the fficiency of the equipment that we use. When ew components, such as those described in his article, become available, we like to trans- ate them into practical circuits that the aver- ge ham can use. The subject circuit falls into his category. Its efficiency surpasses that of ither vibratory or rotary converters. There- ore, for those who like to advance with the tate of the art, I heartily recommend this new ethod of dc-dc power conversion.

[*Continued on page 102*]

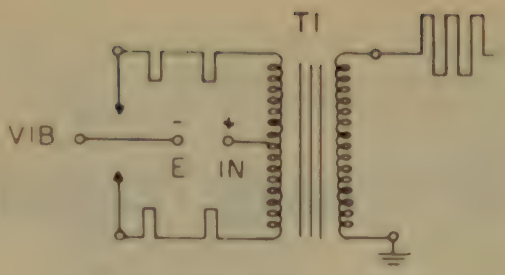


Fig. 1—Basic vibrator connection.

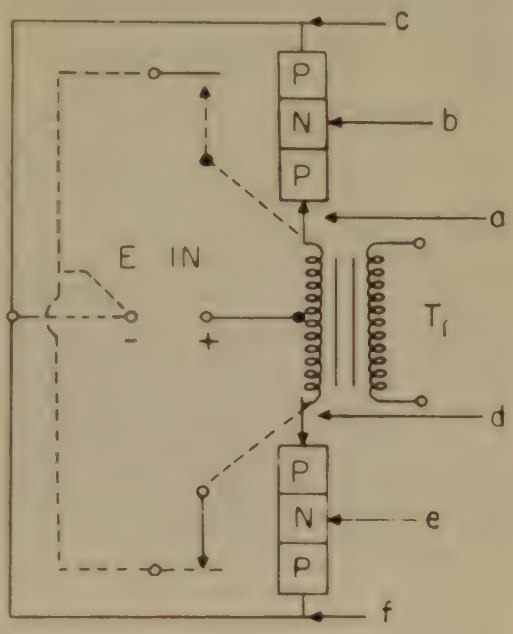


Fig. 2—Transistor-vibrator analogy.

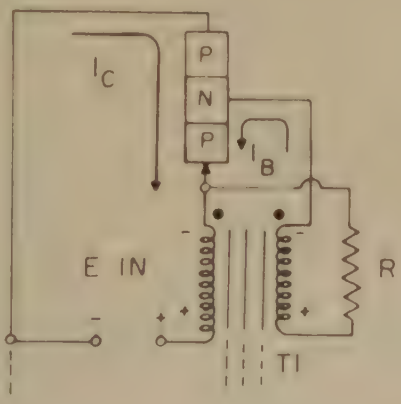


Fig. 3—Transistor circuit operation.

AC Portable Transmitter

by JO EMMETT JENNINGS, W6EI

Jennings Radio Manufacturing Co.
970 McLaughlin Avenue
San Jose 8, Calif.

How many of us have wanted to take a transmitter on a trip but were unable to do so? The problem of weight and size has restricted the use of portable equipment, especially when one is using air travel. The transmitter about to be described seems to fill this need.

Although multiband operation, as well as AM was considered and successfully operated, we felt CW gave the most power for the least weight and size. Single band operation also reduced the antenna problem. 20 meters was chosen, however, other frequencies could be used, depending upon the needs of the operator.

This design should suggest novel ways for others to make further developments in portable equipment. Low cost receiving parts are used throughout, and most of them are available in the junk box. Power input ranges from 100 to 150 watts.

Power Supply

What kind of a power supply would be most suited for this type of operation? Inverters could be a possibility, however the size and weight eliminated that method. Since a power transformer is generally incorporated in high voltage supplies, it was necessary to add several pounds for the weight of the choke and transformer. Even with the best cores, we could not come up with a 100 watt transformer power supply weighing under 5 pounds.

Thermionic rectifier tubes were compared to metallic rectifiers, but did not give the results we desired, due to their high internal drop. Germaniums were quite good, but when the 500 ma. silicon rectifiers were tested, they seemed to exhibit the exact characteristics we desired. Bench tests were made on transformerless power supplies using a voltage doubler and quadrupler. As a means of increasing the power output of the final amplifier, a separate voltage doubling circuit was considered for the oscillator and multipliers. Although the power output was higher when two supplies were used, reduced weight and size caused us to employ only one supply.

One more point regarding the use of th voltage quadrupler which should prove of in terest, is the fact that we could take off ha voltage from the center of the quadrupler an this would give us exciter voltage without a extra power supply.

Selection of Tubes

The radio frequency section would requir the vfo, multipliers and amplifier. The excite section should not be a problem since th miniature tubes would perform in the capacit desired. The PA stage should be small; hav a high plate current capacity, and low filamen drain. A single tube could perform this tas with the exception of the high filament curren at low voltage.

Our next idea was to employ a group of lo voltage tubes each with moderate plate resis ance, and combining series heaters to eliminat the filament transformer. Several types of tube were tested with the elements connected i multiple, and the 12AQ5 finally was selecte as the most satisfactory type. Of the variou tubes tested in the oscillator and multiplie stages, the 12BA6 was selected as a good al purpose type. Naturally, a compensating r sistor was necessary to balance the filamen currents in the series filament arrangemen So far, we have the oscillator, multipliers an final amplifier tubes, all operating with serie filaments in the ac line without a filamen transformer.

Preliminary Testing

When the signal was monitored, we ha 60 cycle modulation which represented abou 30% to 40% of the carrier. The R-C filte networks had no effect upon this modulatio Finally, it was concluded that there were ha monics in the power lines which were respo sible for this problem. Simply by inserting .001 condenser in parallel with the ac line, w were able to cut the hum in half. The hu level was still more than we felt was necessar A .002 condenser was connected across th

utput of the voltage quadrupler which did vay with the hum. After installing voltage gulators across the vfo plate supply, we were ill pleased with the over-all stability of the it. What seemed to be a difficult problem to ire proved to be quite simple.

Radio Frequency Section

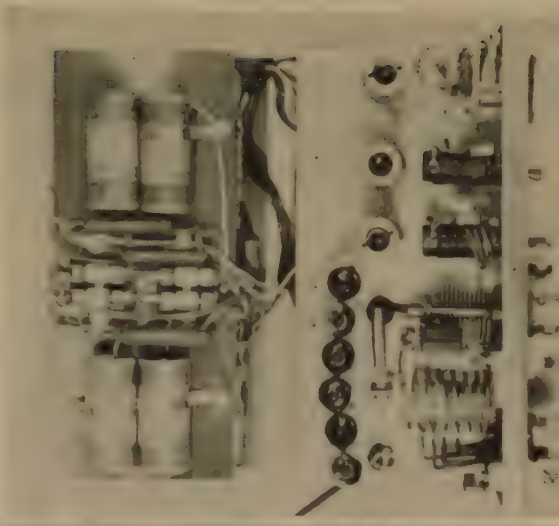
The vfo consists of a feedback type oscillator rcuit using a Hi-C tank circuit with a feed- ck coil wound on a toroid. Approximately 001 fixed capacity is used, having high tem- rature stability. The doublers are all con- ntional, and the keying for the CW is complished in the oscillator. In order to sim- ify the final amplifier, we used a very old utralizing system consisting of a shunt feed pped tank coil with one end grounded. A few rns of wire inductively coupled to this coil as used to supply the neutralizing voltage to e 12AQ5 tubes. The output matched from) ohms to 300 ohms simply by tapping the nk circuit. To save space and weight, a 2 volt o amp. pilot light is used to indicate antenna rrent. As can be seen in the diagram, a pacity rf divider supplies the small amount current necessary to light the bulb. If the lb should burn out, the transmitter will still nction. No other form of metering is used ced weight and space are of such impor- nce. Power supply impedance, conservative tings and stability, do not warrant the use of eters. The schematic diagram shows the sim- ified version of the Portable Transmitter.

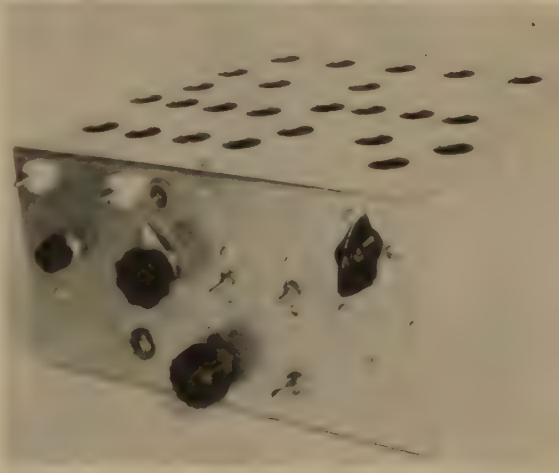
Final Tune-Up, and Operation

After each circuit has been checked and und to be operating correctly, the filaments the tubes are turned on, then the power itch is turned to "on" position. As is shown the diagram, a 200 ohm, 25 watt potentiom- er is connected in series with the rectifier. he reason for this resistance is to limit the rush current to the rectifiers. As soon as the vitch has been turned on, the resistance is duced to minimum and left in that position uring the rest of the operating period. It is fe to leave the power supply on once the ndensers are charged. I attempted to use st the power switch without a limiting re- stor, but promptly destroyed the rectifiers, so r starting, a limiting resistor was inserted. ossibly a high/low switch would serve the me purpose.

The one thing regarding the power supply lack of isolation. Do not, under any condi- on, ground the chassis to ground, because it ill short out the rectifiers through the 115 olts. The antenna connection going to a 50 hm or 300 ohm antenna has been isolated a condenser in each leg in order to eliminate ny possibility of grounding this equipment.

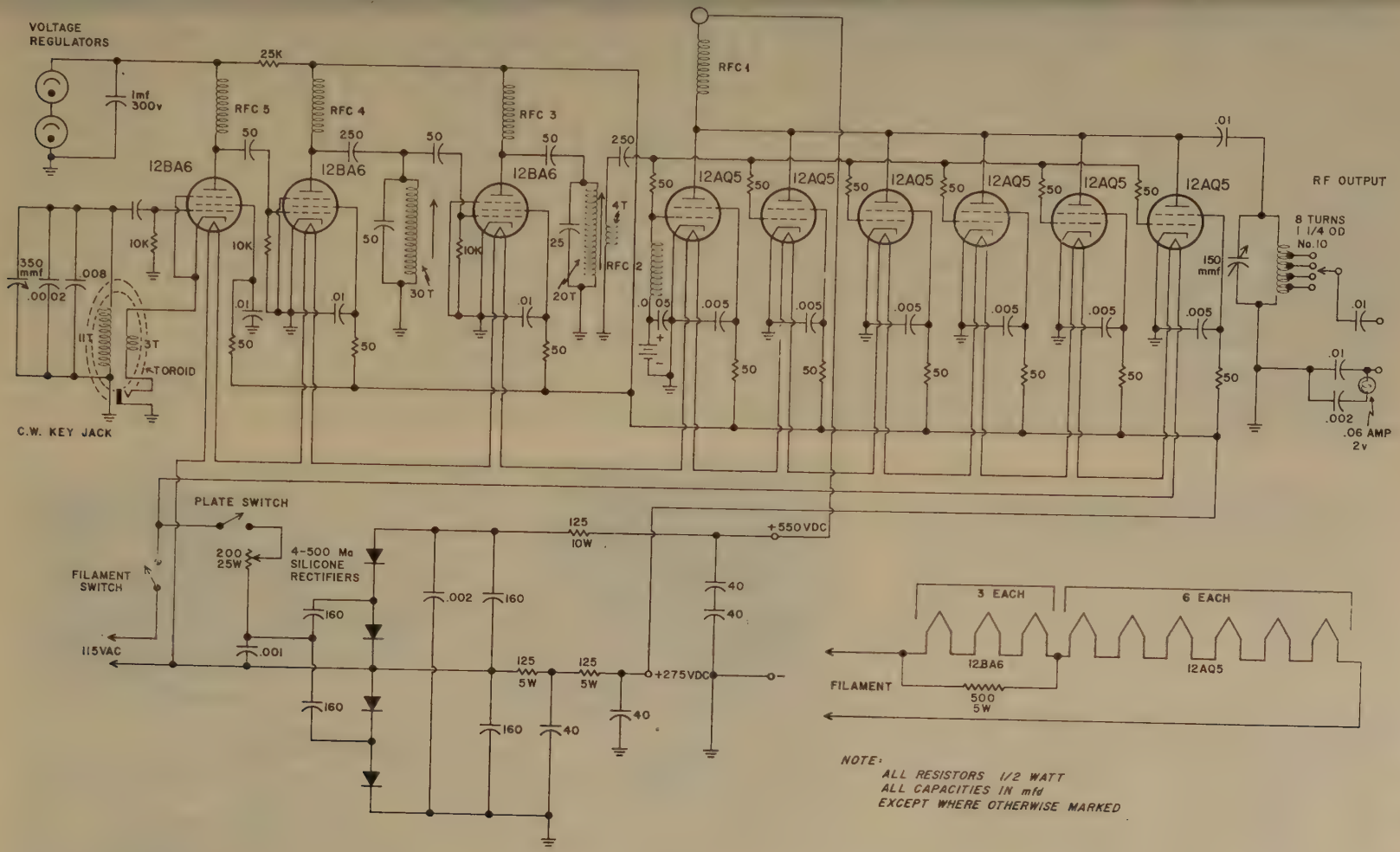
As this equipment is designed, excellent peration has been realized, and the results ere even more startling than those we had pected. Furthermore, the weight of the com- eted transmitter is just 7 pounds. ■





Parts List

11 7 pin minature sockets	1 25 K 6 watt resistor
7 .005 mfd condenser	1 OA 2
5 .01 mfd cond. disc. caps	1 OB 2
1 .01 1200 V disc. caps	4 M500 Sarkes Tarzian rectifiers W clips
2 .002 cond.	1 22½ volt battery-photographic flash
1 .001 cond.	5 2.5 mh rf chokes
1 .000025 cond.	1 Toroid farad 11 turns #12 Formvar, feed back winding 3 turns #22 Formvar
2 .00025 cond.	1 slug tuning 40 meter coil ⅝" od 30 turns #26 Formvar cotton covered wire
4 .00005 cond.	1 slug tuning coil ⅝ od #16 wire, Formvar, 20 turns sec. 1 turns #22 plastic
1 .0001 cond	1 Final tank coil 1¼ od, 6 turns per inch #10 wire. 8 turns similar to alumatronic or equivalent
1 .0002 Negative temp. coefficient	1 CW key jack
1 .008 zero temp coefficient	1 cabinet 9¼ x 9¼ x 5" high
1 .00035 variable tuning condenser	1 line cord
1 1 mfd 300 volt	
1 80 mfd 450 volt electrolytics	
1 40 mfd 450 volt electrolytics	
1 150 mmfd tuning CE = 2005 or equivalent	
15 50 ohm 1 watt resistor	
1 5 watt 500 ohm WW	
1 200 ohm 25 watt WW pot.	
2 125 ohm 5 watt WW	
1 125 ohm 10 watt WW	
2 10 K 1 watt	



Schematic diagram of the AC portable transmitter.

Teletype Reversal Generator

by CHARLES R. TEETERS, K2DHE
311 Birch Avenue, Wanamassa, N. J.

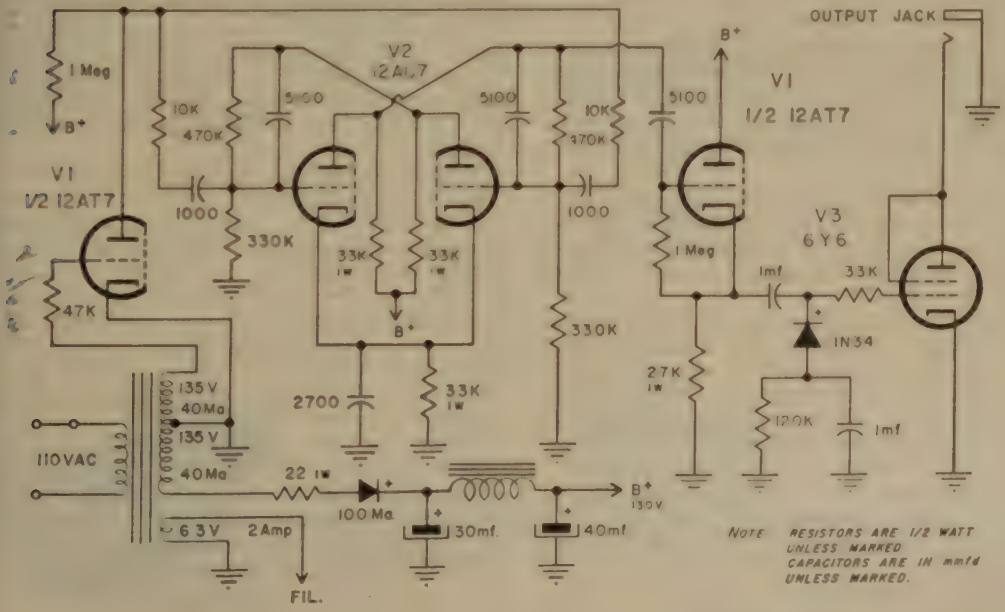
Amateur advances into the field of teletype during the past few years have been tremendous as far as operating equipment is concerned. But as for any teletype test equipment, the amateur has been left in the lurch due to cost and complexity. Commercial test equipment for radio teletype measurement is necessarily complex due to the standards that the commercial stations set for themselves, and that it is designed to operate under working conditions in most cases. Amateur procedure has been pretty much either "it prints or it doesn't" and measurements to reduce the distortion are lacking. The distortion that causes misprints in teletype copy can be introduced at three points; the transmitting equipment, the radio circuit, and the receiving equipment. Since we can do little to control distortion on the radio circuit, teletype test equipment is designed to measure transmitting and receiving equipment so that it can be adjusted to introduce as little distortion as possible.

The most common type of teletype distortion is Bias distortion which is the uniform lengthening of the mark or space pulses of the teletype signal. A mark pulse longer than 22 ms. at 60 speed is marking bias, and a space longer than 22 ms. is spacing bias. Both cannot occur at the same time. Bias distortion is caused by wave shape distortion of the teletype signal, and is most commonly caused in equipment by unbalance between marking and spacing circuits. If the bias distortion exceeds about 35% the teletypewriter will misprint. Since radio circuit conditions can introduce distortion from 0% to 100%, the less distortion in the equipment, the more distortion we can stand from the radio circuit, and the longer the printer produces good copy under increasingly worse radio conditions.

While bias distortion is the most prevalent it is also the easiest to observe and correct. One simple method which can be used as a local test at one station, or made between two stations is as follows. First establish marking condition at the transmitting loop and at the receiving loop connect a millameter and record the receiving marking current, usually 60 ma. Then repeat the process using space and record the receiving loop current, usually 0 ma. Then a square wave with exactly equal mark and

[Continued on page 104]

Schematic diagram of the teletype reversal generator.



Changing The Class C 4-250 To AB_1 For SSB

by E. N. MARRINER, W6BLZ
528 Colina Street, La Jolla, Calif.

"I have a beautiful final using a Class C 4-250. How can I use it on sideband?"

It's easy to switch from Class C to Class AB_1. Change the bias and screen supply. All else remains the same. More filtering of the high voltage power supply could help. 20 mfd minimum should be used.

An advantage in using Class AB_1 is that the grid meter may serve as an overmodulation indicator. When it flicks above .5 ma., for proper drive decrease the speech control slightly. TVI increases when the grid current kicks up.

In *fig. 1* the screen operates at 500 volts (*RCA* rating). Some amateurs run the screen voltage higher, at *Eimac* ratings. Since 500 volts is well within the dissipation limits of the tube, should the high voltage go off for some reason, the tube would be protected. A series resistor could be used, but I have found that sideband distortion seems to increase when the screen supply is unregulated.

VR tubes *plus* screen dropping resistor is still unsatisfactory. The current varies too much for a reasonable number of VR tubes to handle, and the VR'd 500 volts is not absolutely constant. A separate screen supply is best.

The transformer on hand may vary from mine. A series limiting resistor for the VR tubes must be the value to cause a minimum of 5 ma. and a maximum of 40 ma. to flow thru the VR's.

Maximum current should be about 30 ma. in "no-talk" condition. This will drop when the screen draws current. A variable resistor of about 8000 ohms will serve in most cases. Usually the tap will be set at about 2500-4000 ohms to give proper current thru the VR tubes. The resistor should be 60 watts or more.

Transformer *T3* should give 600 volts or more. Then it is possible to maintain a constant 500 volts. Adjustment is made inserting a milliameter at point *X*.

Meters should be used to monitor the screen and plate voltage. In Class AB_1 the plate current flows at all times, making a natural bleeder-voltage regulator for the power supply. For safety, a fixed 100,000-ohm 200-watt resistor is used across the power supply to discharge the condenser.

Plate current idles at 55 ma. The 2400-volt power supply drops to 2000 volts and remains essentially constant with talk. That is, when 20 mfds of filtering is used.

Bias should be measured with a VTVM. If a dc meter of 20,000 ohms-per-volt variety is used, it should be de-inserted from the circuit before applying plate voltage. An approximation of grid voltage is all that is necessary. The final grid-voltage adjustment is made watching the plate current for idle resting current of 55 ma. For this, a variable potentiometer is placed across the bias supply. Varying this varies the resting plate current. Set at 55 ma.

Grid voltage will be about —88. Good bias filtering is necessary to prevent ac modulation of the grid. 40 mfd is good. In operation, the screen current should indicate 7 to 10 ma. on peaks, when talking. If the meter goes in the negative direction (when properly connected) this indicates the antenna is not properly loaded.

Final tuning is done by applying a sine-wave input. Plate meter should read about 100 ma. This is sufficient for tuning. A most satisfactory way is to watch a field-strength meter, tuning the output for maximum with this plate-current setting of 100 ma. Then increase the antenna coupling till the plate reads 160 ma.—an average reading. When you talk, the meter will jump above 200 ma. This gives about 200 watts output—well within the linear range of the tube.

These are not maximum ratings for the 4-250 operating in Class AB_1. But for the amateur who wants a nice, clear signal, "quantity" can be sacrificed for quality. Who cares for big power when you can work Kodiak with 2 watts at 7 p.m. on 75-meter sideband?

[*Continued on page 51*]

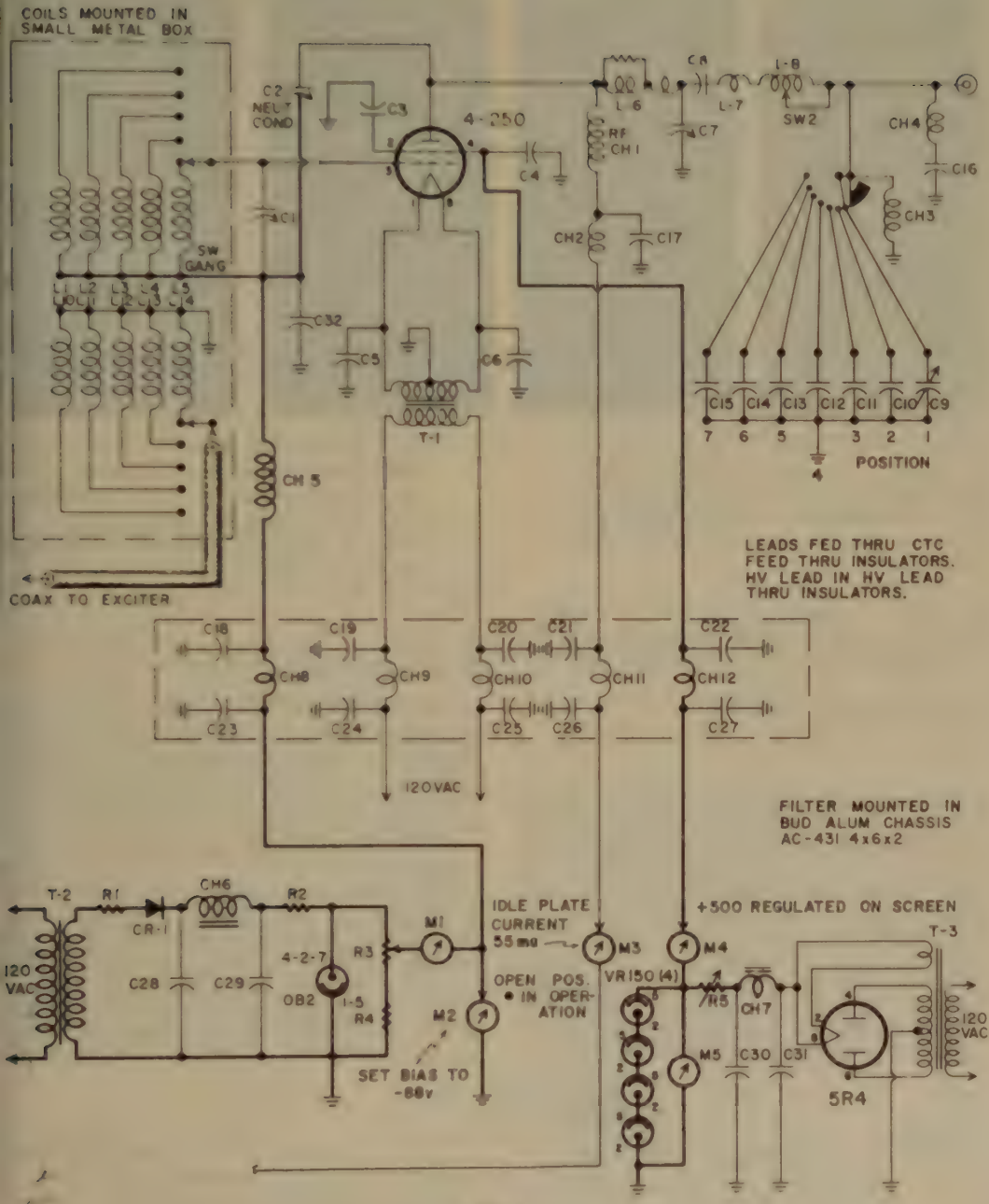


Fig. 1

New Products

Four Outlets

CBC Electronics Company has a heavy duty outlet unit with four outlets and a separate switch to handle each outlet. This should be a dandy gadget for every workshop and ham shack. The sockets and switches are replaceable and are mounted in a hammertone brown metal case. Rating is 15 amperes, 115 volts. Price? Circle F on page 126 for details.

Fig. 1. Improper tuning of driver or exciter.

Fig. 2. Similar conditions as in fig. 1 but improper grid circuit tuning or loading in (a) and (b). (c) indicates linear condition, straight line, 45 degree angle, indicating 180 degree phase shift.

Fig. 3. Improper bias adjustment in (a) and (b). Linear operation in (c).

Fig. 4. Voice patterns. (a), similar to conditions in fig. 2. (b), Similar to conditions in fig. 3. (c), Pattern of the words, "Hello test." Note slight axis shift of scope.

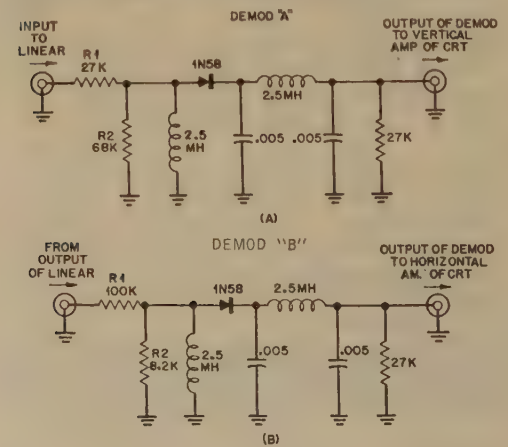
Visual Monitoring of Single Sideband Linear Amplifiers . . .

John W. Govier, W8QNW
18670 Gilchrist
Detroit 35, Mich.

Most SSB operators have at one time or another, made various linearity checks on their equipment, whether it is of the manufactured type or one of the workbench varieties with some personal design features. The test setup usually requires test equipment not readily available to some operators and takes valuable time from others. However, after the tests are concluded and the readings recorded, future operating procedure is based upon the findings.

Some method of monitoring the "on the air" condition is more informative to the operator, as the variations in speech level may become relatively high on peaks resulting in some "flat topping." If the transmitter is equipped with rf feedback, and is controllable, the signal-to-distortion ratio can be reduced and ninety percent of the non-linearity worries are over. Still a visible check on the equipment has its advantages.

The method described for such visible monitoring has been in use for many years, particularly in broadcast stations where directional antennas are used. The rf from each antenna is sampled and returned to a phase monitor, where it is viewed on a scope. Such a system can be applied to a linear amplifier, serving to check on the linearity, output of the



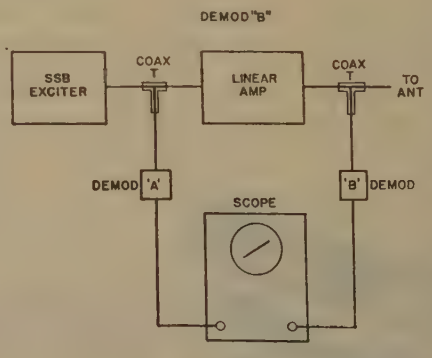


Fig. 9.

Fig. 5. Trapezoid pattern taken from a receiver 455 kc i-f strip.

Fig. 6. Similar to fig. 5, showing three degrees of modulation.

Fig. 7 Two tone test signal through receiver i-f strip. (a), 100% modulation, (b), about 50%, (c), tone input to exciter with no carrier. Adjust for minimum ripple.

Fig. 8. Non-linear patterns in (a) and (b). Note "S" shaped cross over. (c), Linear pattern with clean cross over.

exciter and aids in the tuning and adjustment of the entire system.

The sampling of the input and output of the linear amplifier for visible monitoring can be accomplished by using two demodulators, such as 1N58's, to rectify the rf and, after filtering, apply only audio frequencies to the scope horizontal and vertical amplifiers. Proper adjustment of the scope controls together with sufficient isolation of the two demodulators and a resistive padding arrangement to the coaxial input and output of the linear amplifier will produce a straight line at a forty-five degree angle. This presentation will be available then for on the air mornitoring or for tone testing of the exciter and linear amplifier. The diodes used should have similar characteristics as regards forward and backward resistance in order to have sufficient output, otherwise the loading at the output of the demodulator will have to be increased by using 15K or less.

Fig. 9 illustrates the two demodulators necessary to produce the patterns in fig. 1, 2, 3 and 4. The two units should be built with identical parts and construction technique and the two germanium diodes should have similar characteristics. Two small mini-boxes 3¼ x 2⅛ x 1⅝ inches, fitted with coaxial connectors for both input and output circuits are ideal for such a demod, and can be connected to the linear amplifier input and output circuits with standard T connectors. Due to the power levels involved at both input and output ends of the amplifier, it becomes necessary to reduce the power level to the demods, and also not affect appreciably the impedance of the circuit under test. A resistive pad arrangement shown in fig. 9 will provide ample signal level to operate such scopes as the Heath Model OM-2 and O11 series. Some variation in R1 and R2 may be necessary de-

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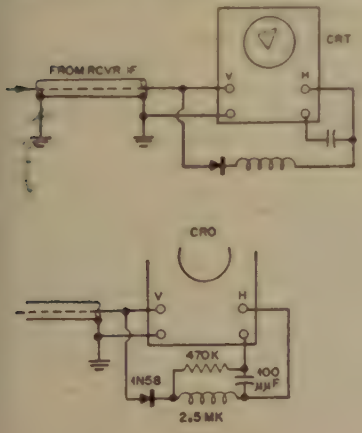


R1	R2	APPROX LOSS IN DB
27K	68K	3DB
50K	50K	6DB
68K	30K	10DB
82K	17K	15 DB
90K	10K	20DB
92K	8K	22DB
95K	5.6K	25DB

Fig. 10.

Do-It-Yourself SSB

by E. H. MARRINER, W6BLZ
528 Colima Street, La Jolla, Calif.

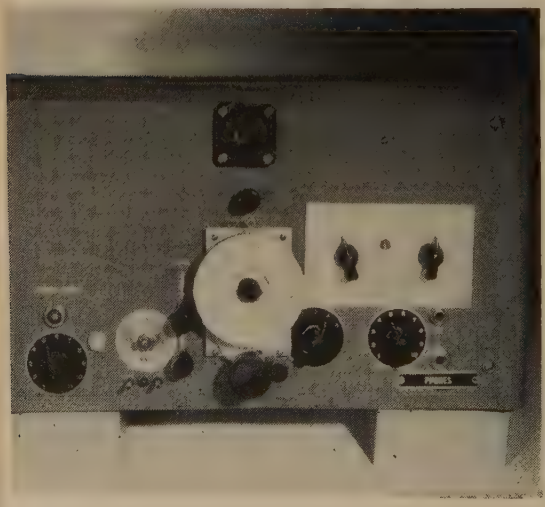
It has been some time since the publication of a construction project involving a phasing type SSB exciter. In this one minimum cost and maximum ease of construction were kept in mind. At first glance, an SSB exciter might seem quite complicated, however, given a set of instructions and perseverance, almost anyone can put himself on SSB. It is essential that you have, or can borrow, a grid dipper, scope and VTVM with an rf probe and an audio signal source of 1200 cycles at about 0.5 V. rms. There is quite a feeling of satisfaction in putting one of these together and getting it to work, and it can be done.

Construction

To begin with, I might suggest that you limit the project to the 80 meter exciter shown in the schematic. The other bands can be added later.

Perhaps the most important part of the exciter is the slug tuned coils used in the 9 mc oscillator tank, the mixer and buffer stages. These were wound on some surplus slug tuned coils, but you can use anything like the National XR50 iron slug coils or the J. W. Miller 1400 series coils. The diameter can be ⅜" to ½". If you would rather not wind your own, they can be obtained from Central Electronics as a complete set. The winding of L3 is critical since the windings must be balanced on each side o fthe center tap. Start with 6 turns of #20 enam. on each side of the center tap on a ⅜" diameter coil and allow room for spacing the turns to hit the proper frequency. The values of parallel condensers used with these slug tuned coils are not shown in the schematic, but if you follow roughly the values shown in the coil winding table you should be able to hit the proper frequency by turning the slugs or pruning.

View of front panel showing method of mounting dial gearing. From left to right the controls are: audio gain, upper/lower sideband selector, carrier balance controls, indicator level (under meter), vfo tuning, function switch, buffer tuning, calibrate level and final amplifier tuning.



This is where your grid dipper will pay for itself, because the inductance of a slug tuned coil will not follow the formula for air or form wound inductors, and they must be tuned approximatly with their respective parallel condensers before permanent installation on the chassis. Incidentally, I should warn you that if you should run into a form with a copper or brass slug, their behavior will not be the same: iron slugs are recommended.

The vfo was removed from the oscillator section of a BC-458 (5.3 — 7 mc) and installed with the components in about the same relative position as in the original unit. All but 11 stator and 11 rotor plates were removed from the oscillator tuning capacitor to allow coverage on three bands. Plates should be removed from the condenser carefully since it is possible to dislodge the glass beads, which are difficult to replace. This can be done with a pair of long nose pliers, slowly working the plates of the rotor back and forth until they come out. The BC-458 dial gearing was removed, mounted on a piece of aluminum and installed on the front panel.

A 10"x14"x3" chassis was used. In laying this out try to follow the original position of

he components since this makes a difference n how the various circuits behave.

The power supply was built on a separate hassis to avoid hum. It should deliver 300 dc at 200 ma., 105 v dc regulated at 40 ma., 00 v dc bias voltage and 6.3 v ac at 4 amps.

Tackle one part of the circuit at a time, hecking it out as you go. Probably the best lace to start is with the audio and VOX cir- uit. Once you talk into the microphone and he VOX relay closes you will feel like you ave accomplished something. The relay used

VOLTAGE CHART

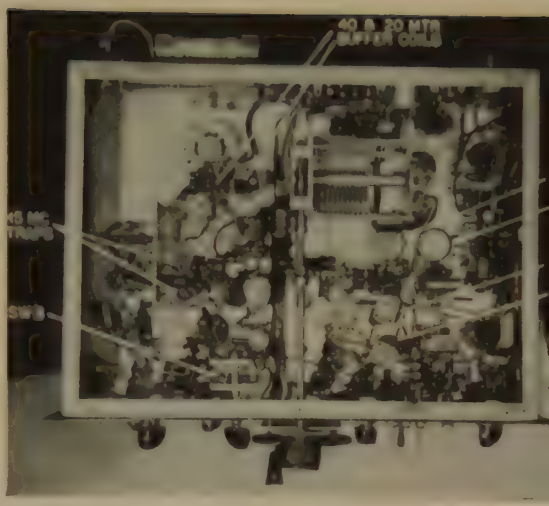
With one balance control unbalanced, the following readings should be approximate on 80 meter band.

	Using R-F probe	D-C
6BA7		
Pin 1		Zero
Pin 2	6-8 v	−12 to −6 function of vfo output
Pin 3	6	−.3
Pin 5	7.5	Zero
6AG7		
Pin 4	5 to 15	−10 to −11
Pin 6		Zero
Pin 5	25	300 Loaded with 50 ohms.

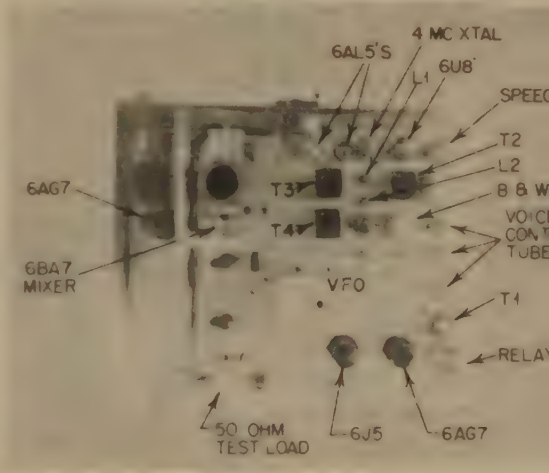
R-F voltage across 50 ohms probe 25 volts.

PARTS LIST

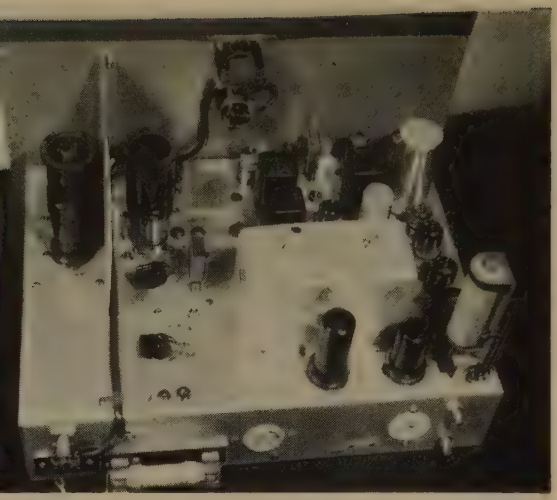
C-1—100 mmfd.
C-2—.001 mfd.
C-3, C-4, C-5, C-6—20-20-20-20 mfd 450 v elec.
C-7—29 mfd 59 vikt
C-12, C-8, C-16, C-17, C-21, C-23, C-24, C-25, C-28, C-31, C-32, C-33, C-34, C-37, C-38—disk .005 mfd.
C-9—200 mmfd.
C-10, C-11, C-15, C-18, C-19, C-22, C-29—disk .005 mfd.
C-13—75 mmfd.
C-14—3 mmfd.
C-20—150 mmfd.
C-26—.005 mfd.
C-27—.01 mfd.
C-30—.1 mfd.
C-35, C-36—380 mmfd. variable
C-39—200 mmfd. part of osc.
C-45, C-40—.05 mfd.
C-43, C-41—.002 mfd.
C-42—.005 mfd.
C-44—20 mfd. 50 volt.
C-46—.25 or .1 time constant condenser. Hold time.
C-47—8 mfd. 450 v
C-48—.25 or .1 mfd.
D & W—Phase unit 2Q4
R-1—5 k ½ w
R-2, R-9—1 meg ½ w
R-6, R-3—2.2 k ½ w
R-4, R-5, R-7—220 k ½ w
R-8—10 k 1 w
R-10—47 k ½ w
R-11—1 k ½ w
R-12—22 k 2 w
R-13—500 ohm pot.
R-14, R-15—270 ohm 1 w
R-16—500 ohm pot.
R-17, R-18—22 k 2 w
R-19—1 k 1 w
R-20, R-29—47 k 1 w
R-21—100 k 1 w
R-22—2 k pot.
R-23, R-24—1 k pot.
R-25—1 k 1 w
R-26—10 k 1 w
R-27—220 k ½ w
R-28—180 ohm ½ w
R-30—4.7 k 2 w
R-31—15 kc 10 w
R-32—10 k 10 w
R-33, R-36, R-34, R-37—1 k 1 w
R-35—22 k 1 w
R-38—20 ohm 1 w part of ant. trim.
R-39—10 k or lower across coil. 2-5 k 2 w in series
R-40—100 k ½ w
R-41—200 k ½ w
R-42—22 k 2 w
R-43—100 k pot.
R-44—220 k 1 w
R-45—470 k ½ w
R-46—2.2 k 1 w
R-47—68 k ½ w
R-48—47 k ½ w
R-49, R-52—470 k ½ w
R-50, R-51—1 meg ½ w
R-53—100 k ½ w
R-54—220 k ½ w
R-55—1 k
R-56—470 k ½ w
R-58—1 meg ½ w
R-59—100 k ½ w
R-60—2 k ½ w
R-61—10 k ½ w
R-62, R-63—1 meg pot.
RFC-1—Parasitic Suppressor 6t #20 on 50 ohm 1 w resistor
T-1—Ouncer UTC 200/500 ohms to 80,000-500 Universal Radio, Los Angeles, Calif. or any low to high impedance
T-2—20,000 ohms to 500 ohms
T-3—3 Transformers can be obtained
T-4—Box 206 Electronics Associated, Montclair, New Jersey—$7.95 or, Rex Radio Supply 88 Courtland Street New York 7, N. Y.—$5.00



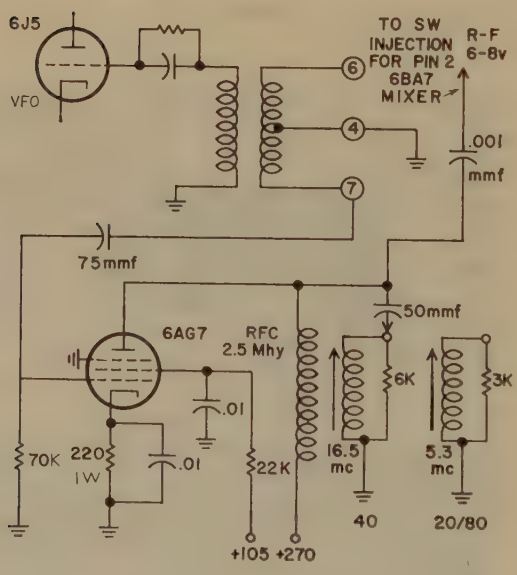
Underside of chassis. Note placing of shielding between buffer and amplifier stages and shield across the 6AG7 socket. All power and filament wiring is shielded and coax is used for rf wiring in strategic places. Wiring between coupling links of slug tuned coils is twisted to minimize stray rf fields.



Top of chassis showing placement of components. The 6U8 driver/xtal oscillator is just ahead of the vfo shield can. Balanced modulators are under the meter at front of chassis and audio, VOX and anti-trip circuits are at extreme right. The 6J5 oscillator and 6AG7 buffer are directly behind the vfo shield. To the left of center is the mixer tank coil L6 at front of chassis, and behind it in line are the 6BA7 mixer, the xtal-vfo selector switch and the buffer band switch. At extreme left is the 6AG7 final and its tank coil.



Suggested circuit adding buffer or tripler to VFO if 40 meter and 20 meter operation is intended. 6AG7 output kept low 6-8 volt R-f equal to VFO injection on 80 meters. Swamping across slug tuned coils broad band and keep output 6-8 volts. Some experimenting to get it exact.



Handy Reference Chart Showing VFO Frequency Mixed With 9mc

VFO set at:	Tunes when mixed with 9000 kc
5500 kc	3500 kc
5200	3800
5000	4000
16000	7000
16200	7200
16300	7300
5000	14000
5200	14200
5300	14300

here is a Central Electronics 12,000 ohm. Any similar relay will work, but make sure the contacts are in good condition. If the relay sticks it will be necessary to adjust the contacts for a wide arm spacing. If there is no screw adjustment a piece of Scotch tape can be placed under the keeper to break the residual magnetism. If the relay fails to close, first check the audio gain control by turning it up, then adjust the VOX control (R62). The control R63 controls the voltage from the speaker bucking the voltage that makes the relay work when LS operation is used. A little experience will show where to set this control to keep the speaker from tripping the VOX system.

Now wire the rest of the circuit, through the balanced modulator, mixer, vfo, and crystal oscillator and the mixer tanks. After this is done, check for vfo and 9 mc crystal oscillation by listening in a receiver. The vfo can usually be calibrated with the small capacitor on top of the fixed oscillator condenser in the field can. Now finish up the 6AG7 final and you are ready for final tune up.

Tuning Up

1. After warm up and checking for oscillation of the vfo and crystal oscillator, unbalance one of the carrier balance controls. Tune L1, L2, L3, L4, and L5 for maximum at 9 mc measuring the rf voltage with your VTVM and rf probe. If this is properly done the rf voltage at pin 7 of the 6BA7 mixer should be between 2 and 4 volts. The vfo output measured at mixer pin 2 should read 6 to 8 volts.

2. Now apply the 50 ohm, non-inductive,

COIL TABLE

No.	Freq.	Diam.	No. Turns	Wire Size	Length	Link	Appx C
L1, L2	9 mc	⅜"	22	#22 enam		4 t	100
L4	9 mc	⅜"	22	#22 enam		4 t	150
L3	9 mc	⅜"	12 Total	#22 enam			.001 ea half. S. Mica
L8	16.5 mc	⅜"	10	#22 enam			100 mmfd
	(loaded down with resistor to broad band.)						
L9	5.3 mc	ARC-5 VFO coil.					
L10, L11	15 mc	⅜"	Buy from Central Electronics or use LS-3 already wound.				
L6	3.8 mc	1½"	19	#20	2"		Var 365 mmfd
L6	7 mc	1½"	12	#20	2"		Var 365 mmfd
L6	14 mc	1½"	4	#20	½"		Var 365 mmfd
L7	3.8 mc	1½"	15	#20	Tight close space tap 4 t up from cold end for output.		
L7	7	1½"	12	#20	Tap up 4 turns cold end.		
L7	14 mc	1½"	4	#20	¼"		

dummy load to the output. Tune C35 (mixer tuning condenser) which should show output on 80 meters on the grid dipper coupled to L6 and used as a field strength indicator. Tune the 9 mc oscillator coil L2 to either side of the resonance peak and then make sure that L1 (coupled to it) is tuned to the opposite side of the peak. This gives us our 90 degree rf phase shift. To accomplish this, peak the crystal oscillator coil L2 for maximum and add just a little more capacity. Tune L1 for maximum and decrease the tuning capacity slightly. The capacitors used in the 9 mc tanks were the 7-45 mmfd ceramic type and can be seen in the underside view of the chassis mounted under L1 and L2. If your receiver has an S meter, tune about 3 db down from resonance. This rf combined with the 90 degree audio phase shift gives us our side band suppression when mixed in the balanced mixer tank circuit.

3. Now check the plate voltage of the 12AX7 modulator with about .05 v rms of 1200 cycle signal feeding into the microphone jack. The plates should be equal, about 210 volts each. Vary the cathode 500 ohm potentiometer and get them as near equal as possible. If the tubes won't balance and one remains at 300 volts and the other 210 volts something could be wrong with the transformers or the phase plug-in unit. A more exacting check is to clip the vertical and horizontal leads of the scope together and with the sweep off, apply first to one and then to the other arm of the carrier balance potentiometers R23 and R24. (The test points on the front panel are for this purpose.) When this is done, a 45 degree straight line should appear (see fig 2). Adjust R16 so that both lines are the same length when changing the scope leads from one arm to the other. Balance the 500 ohm potentiometer R13 while clipping the vertical and horizontal leads across the arms of the carrier balance pots. A circle should appear and be approximately round when adjusting R13. This control will not be touched again after this adjustment is made.

4. Connect the scope as shown in fig. 3. We are now ready to set the 90 degree rf phase. Set the scope sweep frequency to 15 cycles per second and connect a lead from the exciter output terminal to the external scope sync terminal.

Turn off audio gain momentarily to adjust carrier balance pots R23 and R24 for minimum exciter output. Turn up audio gain and alternately adjust R16 and L2 for minimum ripple on scope pattern (fig. 3).

If L3 is properly balanced no appreciable change in the pattern should be observed when switching from upper to lower sideband.

5. Measure the rf voltage at the grid of the final amplifier with the carrier inserted (balance control). This should be about 5 to 10

[*Continued on page 119*]

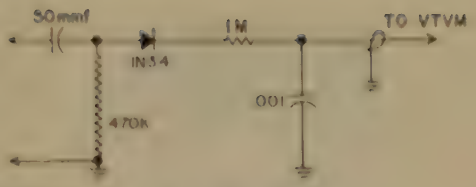


Fig. 1—RF probe.

Fig. 2—Length of line A should equal length of line B.

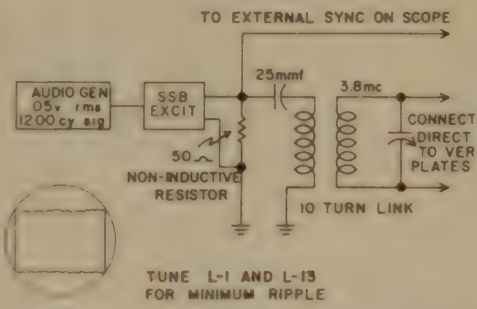
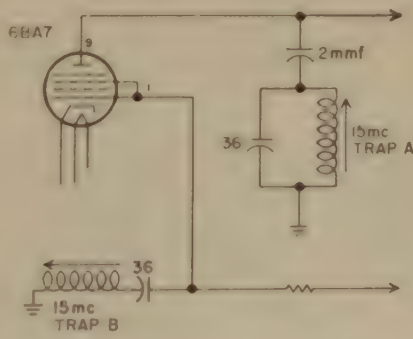
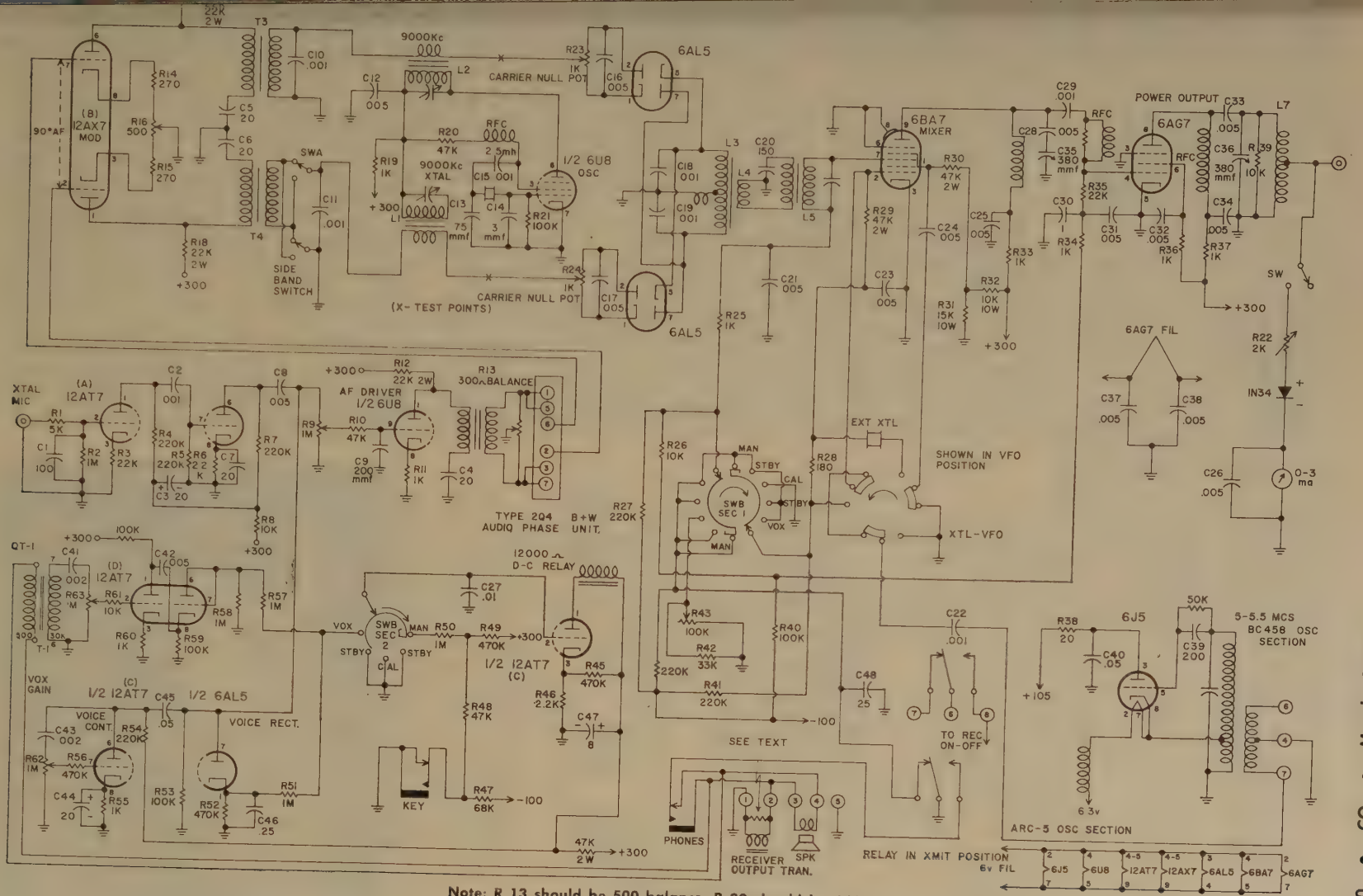


Fig. 3—If scope does not have external sync it will be necessary to control frequency of sweep with your hand to keep the pattern steady. If scope has sync, adjust frequency and sync amplitude until pattern locks in.

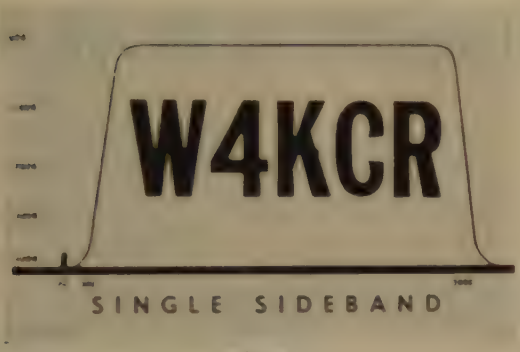


View showing trap A 15.4 Mc to eliminate third harmonic of the VFO. Trap B used to trap harmonic of crystal oscillator. Not used if crystal operation is not intended. These traps are used only if 20 meter operation is desired.



Note: R 13 should be 500 balance, R 30 should be 4.7K.

QSL contest



winner

This month's winner of a year's sub. to CQ goes to Lyn Carr, W4KCR, Charlotte, N. C. Losers are Henry Canvel, W6IWA, Los Angeles, Calif.; Jack Stanton, W9PSP, Chicago, Ill.; Len Julien, K9DEY, Villa Park, Ill.; and George Beyers, K5HVA, Oklahoma City, Okla.

-250 to AB [from page 43]

PARTS LIST

*RCA HAM TIPS Vol. 14 #3

rid Coil Data—Coils wound on [illegible] tubing. Cork glued in one end and [illegible] machine screw run through bolting coil to chassis.

1—80 meters, 21 turns #20 enameled, 1½" dia. L11 Link 7 turns

2—40 meters, 19 turns #20 enameled, ⅜ dia. L11 Link 5 turns

3—20 meters, 8 turns #20 enameled, ⅜" dia. L12 Link 5 turns

4—15 meters, 7 turns #20 enameled, ⅜" dia. L13 Link 5 turns

5—10 meters, 4 turns #20 enameled, ⅜" dia. L14 Link 3 turns

6—Parasitic choke, 8 turns #14 wire Shunt 3-100 ohm, 2 watt resistors across 5 turns of coil

7—10 meters, 4 turns #12 tinned 1" diameter

L8—Final Tank Coil #3852 Johnson variable Roto-Coil

C1—Cardwell type 6017, 140 mmfd variable

C2—National NC800A Neutralizing condenser

C3, C4, C5, C6—.005 mfd disk ceramic 600 volts

C7—Johnson 250D35, .080 spacing, 347 mmfd variable

C8—.005 mfd TV type ceramic 20,000 volt

C9—Variable 245 mmfd, .61 air gap peak voltage

C10—100 mmfd 2500 volt mica condenser

C11—200 mmfd 2500 volt mica condenser

C12—200 mmfd 2500 volt mica condenser

C13—400 mmfd 2500 volt mica condenser

C14—400 mmfd 2500 volt mica condenser

C15—500 mmfd 2500 volt mica condenser

C16—100 mmfd 2500 volt mica condenser

C17 C22 C27—.005 mfd TV ceramic type 10,000 volt

C18, C19, C20, C21, C23, C24, C25, C26—.006 mfd disk ceramic 600 volts

C28, C30, C31—2 mfd 600 volt oil filled

C29—40 mfd 150 volt

C32—500 mmfd mica. This condenser is critical as it is part of the neutralizing circuit and 500 mmfd should be used

R1—33 ohms, 2 watts

R2—1000 ohms, 5 watts

R3—30,000 ohms ww potentiometer

R4—2000 ohms, 5 watts

R5—2000 ohms to 6000 ohms, 60 watt with slider

T1—5 volts at 14.5 amps. UTC S-59 or equivalent

T2—125 volts at 30 ma bias transformer Burstein-Applebee #19B735

T3—600-0-600 volt, 120 to 150 ma

CR1—[illegible] ma Selenium rectifier

CH-1—National 175A

CH-2—Z50 Ohmite

CH-3—2.5 MHY, 125 ma

CH-4—2½ Turns #14 Tinned ⅜" dia.—Resonate at channel 2

CH-5—2.5 MHY, 125 ma

CH-6—Midget choke 50 ma 4.5 Hy

CH-7—120 ma choke

CH-8-9-10-11-12—Ohmite Z-50

M1—0-5 ma

M2—0-150 voltmeter

M3—0-3000 voltmeter

M4—0-1000 voltmeter

SW-1—5 position double wafer

SW-2—Centralab P-1-S wafer single-circuit 7 position ceramic progressive shorting

RCA Tube Rating for 4-250A Class AB1 CCS Rating

Class	Service	Grid Voltage	Peak Grid Voltage	Zero Signal Plate Cur.	Maximum Signal Plate Cur.	Maximum Signal Screen Current	Maximum Signal Power Output	Screen Voltage	Plate Voltage
AB 1	CCS	−88	88	55	200	11	230	500	2000
		−90	90	60	215	7	310	500	2500
		−93	93	60	205	5	370	500	3000

THE BIG GUN

a kilowatt amplifier for AM, CW, or SSI

by WILLIAM ORR, W6SAI
555 Crestline Drive, Los Angeles 49, Calif.

Combining the simplicity of a triode amplifier with the advantage of a pi-network output circuit, this kilowatt amplifier is inexpensive to build and foolproof in operation. It may be used for sideband work as a linear stage, or it may be operated class-C for AM phone and c-w.

* * * * *

Let's face it. The cost of putting a "full gallon" on the air these days is high—and it will probably be a lot higher in the future. This bleak fact was brought home to my buddy, W6WWQ one fall day when he was busily engaged adding up the cost of kilowatt parts on a torn piece of cardboard with a micro scopic pencil stub.

"E-gad!", quoth he. "By the time I buy th vacuum capacitor, the rotary kilowatt coil an the two tetrode tubes, I'll be in the hole ove two hundred and fifty bucks".

"Too bad the 4-400A's aren't on the surplu market", I replied unfeelingly. Why don't yo use some of those ninety-nine cent 304TL's?

"The ninety-nine cent 304TL's are now nin dollars and ninety-nine cents," he replie "Besides, who uses triodes nowadays? They' as extinct as the *Pilot Super-Wasp*."

"Look here," I said. "A kilowatt is a kilowat no matter which tubes you use. You want cheap gallon—right?"

"Right", he answered, "But there ain't s such animal—not with tubes at sixty bucks throw, and expensive stuff like—".

"Wait! Stop!" I reached for a pencil and piece of paper. "Don't sell the triode shor Here's the dope on a kilowatt final that I b you can build for far less than one hundre dollars, including the price of a surplus tub Let me sketch it for you."

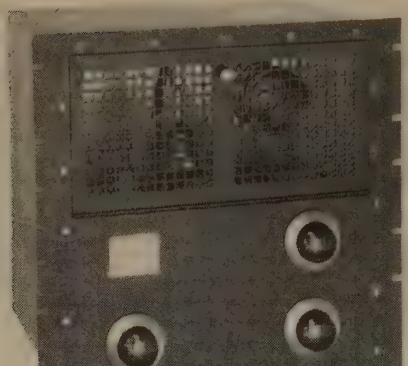
"A triode tube with a single ended pi-ne work? How do you neutralize it? I think you' giving me the business", he replied weakly.

"This is it", I replied. "Look at the sch matic, you lucky ham. You're practically the air".

* * * * *

The amateur designer is overlooking a goo bet if he does not examine the possibility using low capacity triode tubes for high lev r-f amplifiers. Because of the ease of excit tion, the use of pi-network output circuits, a the supposed freedom from neutralization, t tetrode tube has pushed the triode tube out the limelight.

Actually, a pretty good case can be built for the triode tube. Using modern exciters, e citation is not the problem that it used be. Modern commercial exciters, such as t *Viking Valiant*, the *Heath DX-100*, and t *Hallicrafters HT-32* have power outputs of o hundred watts or more. Trying to use the



THE BIG GUN. An inexpensive triode amplifier designed for 14 mc operation. Using a single 450-TH triode, this pi-network amplifier may be used for phone, c-w, or SSB operation. Hinged door in panel top allows the plate coil to be removed. Control at center-right is the plate tuning capacitor, with pi-network loading capacitor directly below it. At the left is the grid tuning capacitor, with a tuning chart above it. Amplifier is completely enclosed for suppression of harmonic energy.

equipments to drive tetrode amplifiers usually leads the operator into the situation where he has to dissipate or throw away a great percentage of the output power of the exciter. This is easier said than done—and usually costs extra money, too! The excitation requirements for a triode amplifier are much more in line with the power level of these exciters, and extra driving power need not be squandered.

It is interesting to note that tetrode tubes *should* be neutralized. You will note that most of the modern transmitters employing tetrodes do neutralize them in order to obtain maximum stability. This punctures the old idea that tetrode tubes require less complex circuitry than do triodes, since the tetrodes supposedly do not require neutralizing circuits.

An "ace-in-the-hole" for the triode tube is that it requires no screen supply. Out the window go the regulated screen supplies and overload protection circuits required by the tetrode! Just look at *fig. 1*. Here is the circuit of a kilowatt triode amplifier. Did you ever see anything more simple than this?

The Neutralizing Circuit

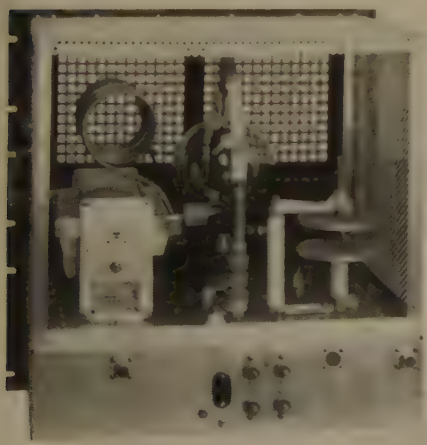
In order to use a pi-network output circuit, it is necessary to dispense with the usual split plate tank coil normally found in the triode amplifier. A form of grid neutralization is used to produce the necessary out of phase neutralizing voltage. A simplified schematic of this neutralization circuit is shown in *fig. 2*. Drawing *A* shows the essentials of the grid neutralizing circuit. Tank circuit L1-C1 has equal and opposite rf voltages at the ends, by virtue of the rotor of C1 being grounded. One end of the grid tank is attached to the grid of the tube, and the other end returns to the plate of the tube through the variable neutralizing capacitor, NC. When this circuit is redrawn as a bridge, as in sketch *B* the neutralizing action is apparent. For bridge balance the following equation must be satisfied:

$$\frac{CB}{BD} = \frac{CA}{AD}$$

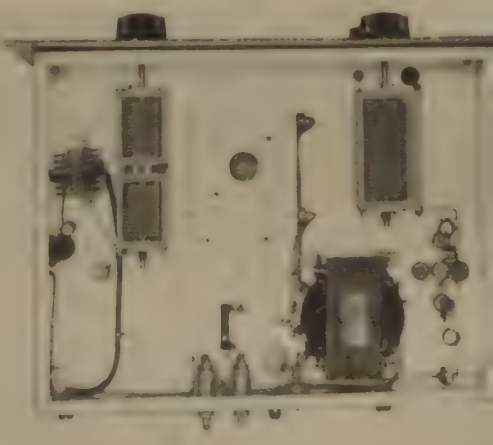
CA is the grid-plate capacitance of the triode tube, AD is the grid-filament capacitance of the tube. Both of these capacitances are fixed, and are determined by the structure of the tube. The capacitance BD may be considered to be the stray capacitance to ground of the neutralizing condenser. Both BD and AD are shunted by the capacitance of the grid tuning capacitor, C1. If the value of C1 is sufficiently large, any unbalance in BD/AD may safely be neglected.

To neutralize this circuit, therefore, if the two halves of grid tuning capacitor C1 are equal, it is only necessary to set neutralizing capacity NC equal to the grid-plate capacitance of the tube. In passing, it should be noted that the grid tank circuit should be high-C—as high

Rear view of the "Big Gun" with the top shield removed. Plate tank circuit is at the left of the 450-TH tube, with R-175A plate r-f choke and neutralizing capacitor shown in front of the tube. Heat radiating connectors are used on grid and plate terminals of the tube. Shielded enclosure is built up of ½"x½" aluminum angle stock and perforated metal sheet. Far end of plate tank coil is attached to 3-inch ceramic insulator mounted in front of the main tuning capacitor. Copper tubing lead then goes from the insulator, through the chassis to pi-network capacitor located beneath the chassis.



Under-chassis view of 450-TH amplifier. The front panel and tuning dials are at the top of the photograph. At the left is the split-stator grid tank tuning capacitor and grid coil. The 450-TH tube socket (mounted in the supporting box) is at center, with the coaxial filament capacitors on the right side of the box. To the far right is the pi-network output tuning capacitor, and the TVI filter. The filament transformer is at the rear (bottom) of the chassis. All power leads are brought out the rear lip of the chassis. Coaxial capacitors are used on all power leads, except the high voltage terminal.



as you can make it. The neutralization adjustment is apt to be fuzzy when a low-C grid circuit is employed. In this case, an effective capacitance of 70 mmfd is used for 14 mc operation. A neat "gag" is to use a 21 mc, 50-watt grid coil for 14 mc operation. It seems to work out just about right. The circuit works best with low-C tubes such as the 250TH and 450TH. High capacity "bottles" like the 304-TL are "out" as far as this circuit is concerned. (Aside to the reader: W6SAI had a single 304-TL tube on 3.5 mc CW for several years, using this circuit. It worked fine, but he never tried it on 14 mc.—*Editor*).

The Output Circuit

The output may be taken from point C and point D of *fig. 2*. This comprises a single-ended circuit, so the popular pi-network may be employed to match the amplifier to low impedance coaxial transmission lines. Real economy may be achieved by using a pi-network with home-made copper tubing inductances. If single band operation is contemplated, the plate coil may be bolted in place and forgotten. Such is the case with the amplifier shown in the photographs. Designed for 14 mc CW and SSB, the amplifier uses no costly plug-in jacks and plugs. The coil is bolted between the terminals of the tuning capacitor.

If desired, the TVI filter of *fig. 3* may be placed between the pi-network circuit of the amplifier and the coaxial output connector, J2. This simple filter may be seen in the under-chassis photograph. It requires no shielding, yet protects channel 2 with over 50 db of attenuation. The attenuation is even greater for the higher TV channels.

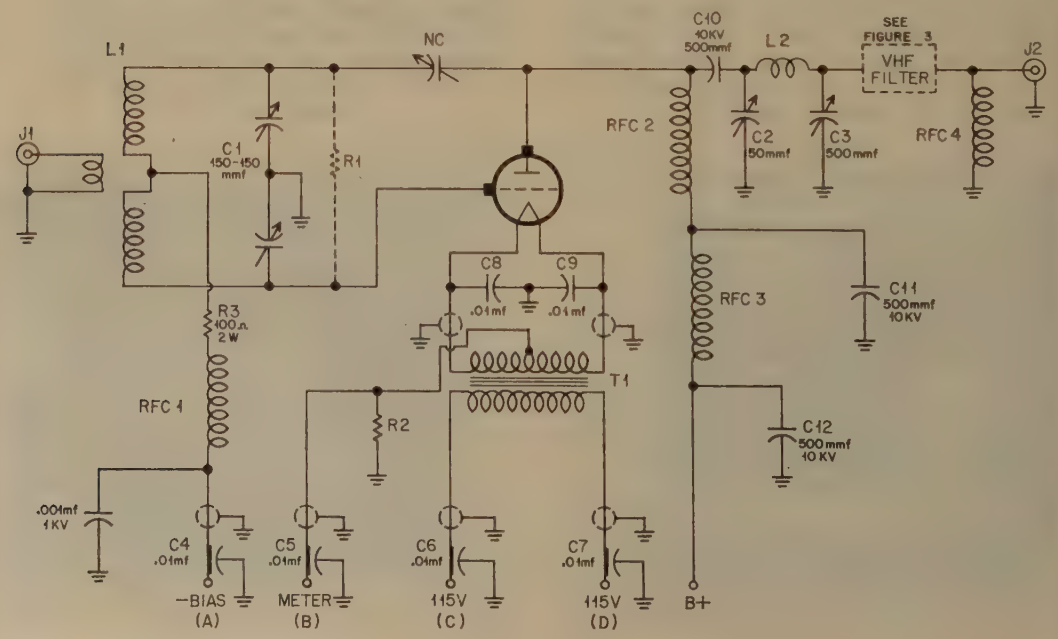
The Tube

The transmitter was designed for a single 450TH tube. This tube will run at a cool kilowatt at a plate potential of 2000 volts. The efficiency at this voltage is about 10% lower than that obtained at 3000 volts plate potential. Also, for SSB operation, 3000 volts or higher is to be preferred for best linearity.

A good tube that is available on the surplus market is the 6C21. This radar pulse tube is a "sleeper" in that the general characteristics are unknown to most dealers and hams. The going price of the tube is less than fifteen dollars, and it is a lot of tube for the money. In general, the 6C21 is a cross between the 450-TH and the 1000-T. The 6C21 has the 1000-T filament and grid, and the 450-TH plate. Filament requirements are 7.5 volts at 15.5 amperes for normal ham operation. The amplification factor is 30 (a little lower than the 450-TH) and the grid-plate capacitance is 4.3 mmfd (slightly less than the 450-TH). The 6C21 is available in quantity, and seems to be made by either *Matchlett, General Electric,* or *Westinghouse*. Of the three makes, the Matchlett is the huskiest, having a plate dissipation close to 900 watts. The plate dissipation of the other two makes is nearer 600 watts. (*Barry* in N. Y. sells tested 6C21's for $13.50 each.)

It is a smart idea to test the tubes before you purchase them. Many of these big tubes tend to go "gassy" after sitting on the shelf for a few years. If possible, ask the dealer to let you try the tubes out before you hand over your hard-earned money for them. This is easy to do. Attach a lead from the grid of the tube to one of the filament pins and apply filament

Fig. 1—Schematic diagram of kilowatt amplifier.



voltage. If all seems well, apply about 2000 volts d.c. to the plate. If the tube is gassy, it will light up with a bright blue glow, like an 866 rectifier. If the tube is "hard", it will draw about 500 milliamperes, and the plate will become a bright red in color. You'll have no difficulty separating the good tubes from the bad ones by this test. The schematic for the set-up is shown in *fig. 4*.

Amplifier Construction

The amplifier construction is shown in the various photographs. A *Bud* 17"x13"x3" chassis (*AC-420*) is used for the base, and a 17½" panel is made up of two separate panels. The top section has a hinged door in it for easy removal of the plate tank coil. The *Bud PS-815* ventilated door rack panel (12¼" high) can be used. The lower panel is 7" high (*Bud PS-1253*), making the total height of 17½". The lower panel is allowed to underhang the chassis about ½-inch or so to center the tuning knobs on the panel.

The triode tube is mounted in a standard "50-watt" socket that is submounted below the chassis to permit clearance between the plate of the tube and the top of the cabinet. A foxy way to mount the socket is to place it in the bottom of a 3"x4"x5" aluminum miniature box, as shown in the under-chassis photograph. The tube is centered on the chassis, and then moved to the left (viewed from the front of the chassis) a sufficient distance to clear the variable capacitor by about an inch. A large hole is drilled or cut in the chassis to clear the tube. The "top lid" of the socket box is discarded, and the side framework of the box is bolted to the chassis, directly beneath the socket hole. The 50-watt socket is mounted upon the "bottom plate" of the box. Two holes are drilled in the side of the box to mount the filament bypass capacitors, C8 and C9. These husky capacitors are required as an anti-TVI measure, in addition to carrying the heavy rf current flowing through the filament circuit of the tube.

The grid circuit variable capacitor C1 is placed to the left of the tube socket, with the grid coil beside it. To the right of the socket is the pi-network loading capacitor, C3. These capacitors are spaced so that the tuning dials are equidistant from the center line of the panel. To the rear of the under-chassis area are the filament transformer, the TVI filter, and the coaxial feedthrough capacitors mounted on the rear lip of the chassis.

Placement of parts may be seen in the rear view photograph. The pi-network coil mounts between a rear, insulated terminal of plate tuning capacitor C2, and an insulated terminal of loading capacitor C3, which is mounted beneath the chassis. The plate coil lead passes through a 1" hole cut in the chassis deck, and bolts directly to the stator terminal of C3. This insures an extremely low loss tank circuit.

The tube socket is oriented so that the grid pin of the 450-TH or 6C21 tube projects to the left (as viewed from the rear). A heat-radiating connector is used on the grid pin. Directly behind the tube (or in front of it, if you're looking at the rear view photograph) is located the *National R-175-A* plate choke. This choke does a heroic job at a kilowatt input. The usual "garden variety" of choke will go up in a puff of smoke when subjected to such brutal use. The specified choke, or the new *Raypar RL-100* rf choke are rugged enough to stand the gaff.

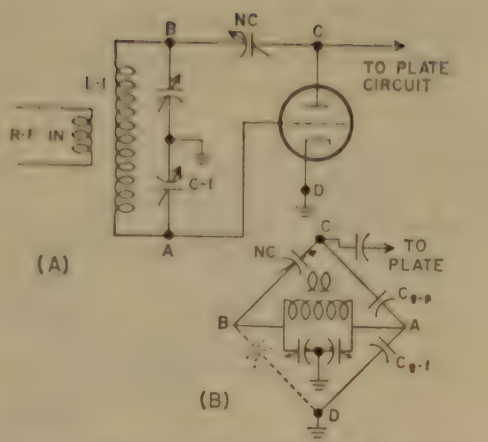
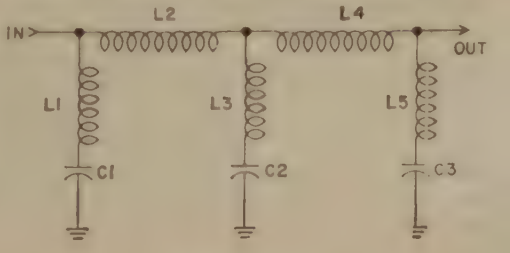


Fig. 2—Analysis of grid neutralization for triode tube. Equivalent bridge circuit is shown at right.

To the right of the rf choke (still looking at the rear photograph) is the disc-type neutralizing capacitor. A ½-inch wide copper strap runs from the top mounting bolt of the capacitor to the top terminal of RFC-2, and over to the 500 mmfd, 10KV television-type plate blocking capacitor. This unit is supported at one end by the insulated mounting terminal of the stator of tuning capacitor C2.

As a passing note, it should be mentioned that these TV-type capacitors employ a titanium-dioxide dielectric material that exhibits piezo-electric effects. You will notice this if you plate modulate this amplifier. The "TV condensers" in the B-plus lead will "talk back" to you after a fashion. No harm done, but it is a little startling to hear your own voice come back at you from the final amplifier! If you are inclined, you can substitute the *Centralab type 858* ceramic capacitors for the "TV ca-

Fig. 3—TVI filter for 52 ohm coaxial output circuit.



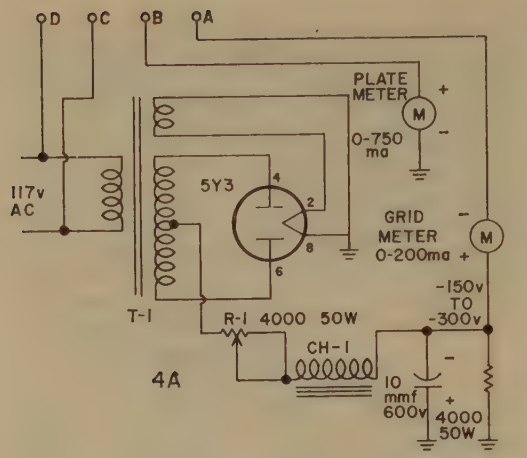


Fig. 4a

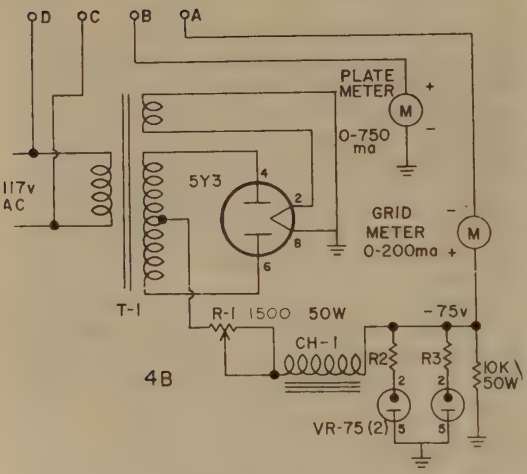


Fig. 4b

pacitors". These will not talk back, but they cost about twice as much as the latter.

The B-plus lead and the grid lead to the tube pass through the chassis via 2-inch ceramic insulators. A third feedthrough-type insulator mounts beneath the neutralizing capacitor(NC). A short piece of ½-inch copper strap is connected between this insulator and the bottom circular plate of NC. Under the chassis, the insulator lead connects to the opposite end of the grid tank tuning capacitor (C1) from the end attached to the grid lead of the tube.

All under-chassis wiring that *does not* carry rf is encased in shielded braid, which is easily slipped over the leads. This prevents spurious currents from being induced in the leads from the "hot" components, and at the same time reduces the harmonic components that are flowing in the leads. The shielded braid is grounded to the chassis at each end of the wire. Filament leads are made of #10 insulated wire and run directly from the coaxial capacitors mounted on the side of the filament box to the terminal lugs of the transformer. A short length of coaxial cable is used for the short run between the link terminals of the grid coil socket and the SO-239 coaxial fitting mounted on the rear of the chassis.

TVI Shielding

The complete transmitter is enclosed in an aluminum shield for TVI suppression. It is very well to bypass all the power leads of the transmitter and employ a low-pass filter in the output circuit, but unless these precautions are backed up with effective shielding of the *complete* amplifier, their effectiveness will be greatly reduced.

The frame for the aluminum shield is made from lengths of ½"x½" aluminum angle stock. The material shown was picked up in the local junk yard, but there is no reason why *Reynolds do-it-yourself* aluminum (available in most hardware stores) cannot be used. As you can see in the photo of the rear of the amplifier, the aluminum framework is about ¼" less in height than is the amplifier panel. Two strips of aluminum angle stock hold the two panel sections together, and form the front supports for the sides of the shield. A third piece of aluminum is bolted across the front of the panel at the top. The mounting bolts for the framework may be seen in the front photograph of the unit. Be *sure* to clean the paint off the back of the panels where they make contact with the aluminum stock. This will preserve the continuity of the shield.

Sides, top, and back of the shield are cut from perforated aluminum stock. Again, junk yard aluminum material was used, but there is no reason why the *Reynolds* metal cannot be used. The bottom plate (removed for the under-chassis photograph) is also made of perforated material. The use of this type of material will insure maximum ventilation of the amplifier tube, which gets "plenty hot" when it is run at maximum input. Notice that the bottom of the tube socket mounting box has a one inch hole cut in it to allow convection cooling of the filament leads of the tube. The air passes through this inlet, up through the tube socket, and out through small holes that are located in the sides of the tube base.

The Bias Supply

The mode of operation of this amplifier depends upon the type of driving signal that is applied to it, and the amount of grid bias supplied to the tube. By juggling these two parameters we may make the amplifier operate as a class AB2 linear amplifier, or a class C amplifier. Bias requirements vary from −50 volts for Class AB2 operation to −300 volts for Class C plate modulated service. Maximum *peak* driving power for sideband service when the amplifier is operated at a plate voltage of 3000 is about 20 watts. To this power must be added the amount of power lost in grid swamping resistor, shown in dotted lines in *fig. 1.*

he input impedance of the amplifier varies ver the rf cycle. When no grid current is rawn the impedance is almost infinite. At eaks of rf grid current the impedance drops a value in the vicinity of 10,000 to 15,000 hms. In order to bring this impedance excur- ion within reasonable limits it is necessary to lace a swamping resistor across the grid cir- uit. A value of 10,000 ohms is approximately orrect. In practice, the resistance should be owered in value until a shortage of excitation s noticed. The lower the resistance value, the etter the regulation of the grid circuit. The esistor may be made up of a number of -watt carbon resistors connected in series arallel to provide a dissipation of about 30 atts, or it may be a larger non-inductive re- stor. Class AB2 operating characteristics may e determined for the 450-TH from the *Eimac* ata sheets. The data for the 6C22 is not given or linear operation but may be determined raphically from the tube curves. *Eimac* fur- ishes transparent overlays and instructions as o how this is done.

A bias supply suitable for class C phone or W operation is shown in fig. 4A, and a bias upply for linear operation is shown in fig. 4b. he reader is referred to chapter 5 of *Single Sideband Techniques*, by Jack N. Brown, W3SHY for full information concerning the djustment and operation of high powered inear amplifiers.

The TVI Filter

Before we pass on to amplifier tuning, let's ake a quick look at the TVI filter shown in he under-chassis photograph. The schematic s shown in figure 3. The filter is designed to rovide maximum protection for TV channels or 3, depending upon which is in use in your rea. Attenuation on the higher TV channels s very high. The filter coils are wound of #10 nameled wire. Coils L1, L3, and L5 are mounted vertically, between the capacitors and oils L2 and L4 which are mounted in a hori- ontal position. The coils are wound on lengths of dowel rod, and are then slipped off, leaving hem self-supporting. The junction of coils L1 nd L2—and the junction of coils L4 and L5 nay be temporarily shorted to the chassis with a short length of ½-inch copper strap, and L1 nd L5 may be grid-dipped to TV channel 2 or 3, with the aid of a g-d-o. This will insure naximum harmonic supression at these critical requencies.

Amplifier Tuning and Adjustment

And now you've gotten the "big gun" com- pleted! The tube is in the socket, and we're all set to tune it up! The first step is to neutralize the amplifier. Place a temporary short across coaxial output jack J2, and tune output load- ing capacitor to full capacitance. Turn on the filament voltage and adjust it to 7.5 volts. Apply the correct value of negative grid bias, and supply rf excitation to the amplifier until a grid current of about 40 milliamperes can be read on the grid meter in the bias supply. Tune grid capacitor C1 for maximum grid current, reducing excitation to keep the current level below 40 ma. Now, tune plate tuning capacitor C2 to resonance. This point will be noted by a kick in the grid current reading. Adjust the spacing of the turns of L2 so that resonance occurs at about 75% capacity of C2. You are now ready to neutralize the amplifier.

A 6.3 volt, 150 ma. flashlight bulb (brown bead) is placed in the center of a loop of wire. This loop is loosely coupled to the plate coil (L2) of the amplifier. It will indicate the presence of rf in the plate tank circuit by lighting up. Do not couple the bulb too closely to the plate coil, or you will burn it out. It is easy to hold the bulb in position with a piece of paper tape. *Caution!* No plate voltage is applied to the amplifier during this test. The B-plus lead to the amplifier should be completely removed!

Now, using a *fibre* screwdriver, slowly turn the top plate of the neutralizing capacitor. The top plate should be rotated back and forth until minimum rf is noted in the flashlight bulb. The bulb should be brought nearer to the coil and a finer adjustment is made. The neutralizing capacitor (NC) should be varied until an absolute minimum of rf is observed in the plate circuit of the amplifier stage. No deflection should now be noted on the grid meter as the plate tuning capacitor (C2) is tuned through resonance.

The jumper should now be removed from antenna receptacle J2, and the amplifier is connected to the coaxial antenna lead. Capacitor C3 is set at maximum value. Low plate voltage is applied (a thousand volts or so) and the amplifier is loaded to about 200 ma. plate current. If the amplifier is properly neutralized, detuning the plate capacitor (C2) either side of resonance will cause the grid current reading to decrease. If the grid current increases as the plate circuit is detuned from resonance, the neutralizing capacitor should be varied a small amount until the increase disappears. *Be sure* to turn the plate voltage *off* before you touch *anything* inside the amplifier enclosure! As a safety measure, remove the B-plus lead from the amplifier before you attempt any adjustments.

The amplifier may be loaded to the legal power limit at any plate voltage above 2000. A nice, convenient operating plate potential is 3000 volts. At a plate current of 330 ma. the amplifier runs a "cool kilowatt" for either phone, CW, or SSB operation. Cut-off bias is provided for CW operation so the exciter may be keyed with no danger to the amplifier. Incidentally, the plate current meter (located in the bias supply) reads *Cathode* current of the amplifier. The value of the grid current must be subtracted from the meter reading to obtain the true plate current value.

[*Continued on page 94*]

by KENNETH B. GRAYSON, W2HDI
110-20 71st St., Forest Hills 75, N.Y.

SURPLUS

Some of the surplus on the market seems to be going to waste strictly because it is FM and as such can't be used on most of our phone bands. The SCR-608 series is one example of a fine piece of gear for 10 meters that could be used for CD and net operations. While the receiver is FM too, simple changes could convert it to AM—like changing the limiters to pure IF amplifiers and modifying the detectors. But the transmitters offer a lot—and at low cost too. One of the things overlooked on FM gear is that by not using the audio (not modulating) the transmitter is a CW job. By adding an AM modulator we have an AM transmitter—sounds simple—and it is.

Of course the problem of power supplies is always present but you need them anyway. So lets get into the theory of the modulators used.

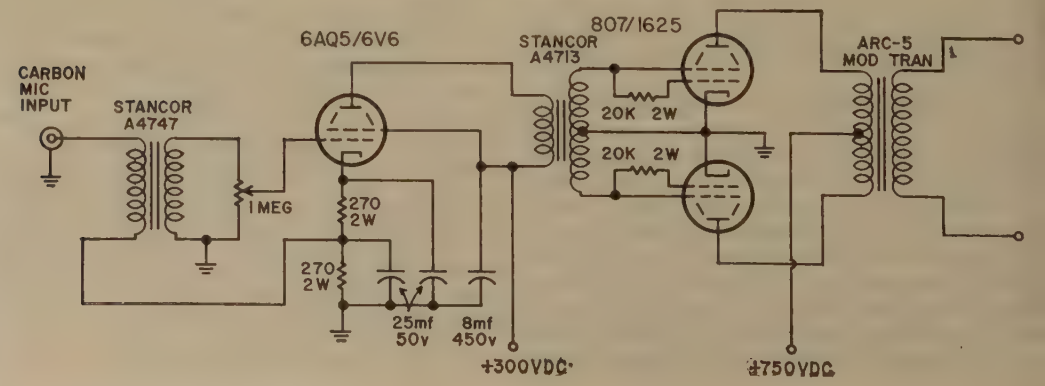
First of all lets get the transmitter going on the air (see CQ Jan 58 page 64) and make sure its working properly. Now by disabling the reactance (FM modulator) circuit we should completely change over to a CW rig. This can be done in several ways. For instance—not use the microphone input—although hum pickup may cause a slight bit of modulation. We could also remove the reactance tube and completely satisfy our problem. However if the set has series filaments we will possibly turn off other stages by accident. This can be overcome by substituting an empty tube base with an appropriate size resistor across the filament pins to complete the filament circuit. The other approach is to cut out the circuitry of the reactance circuit so as to completely disable the FM modulator. This latter step has one disadvantage—namely that should you ever have a need for the FM you won't have it—besides its extra work.

The next thing is to construct a modulator. Several factors determine the modulator to use: How much power is required? Carbon, crystal or dynamic microphone input? Size?

Of course power is determined by the stage to be modulated. If the input voltage to the final stage is 300 volts and the current 100 Mils then $\frac{300v \times 100\ Ma}{1000} = 30$ watts. The impedance to be modulated is $\frac{300v}{100\ Ma} = 3000$ ohms. Since our modulator must supply one half of our final input power for 100 percent modulation we need a 15 watt amplifier. We should allow a little extra for a safety factor.

With a carbon microphone (T-17 type or F-1 button) we need less gain than with a crystal or dynamic microphone. The carbon microphone is readily available and relatively cheaper than the other types. True it may not sound as good, but it does the job and that's what counts.

Fig. 1—15 watt modulator.



The circuits shown here are probably the simplest modulators you can build for surplus gear. I have used all three with good results. Figure I is suitable for any 10 to 30 watt rig. By adjusting the volume control to allow 100% modulation the output power is, of course, controlled. Some nice features are included—such as the class B output stage. This means that a smaller transformer can do the job. The maximum output is about 17 watts. The 1635 tube is a zero bias twin triode and can take quite a bit of an overload. It is surprising that this tube is used as little as it is. It draws only about 5 Ma with no signal and 350 volts DC on the plate, yet can pull 70 Ma with peak signal with no effort. Carbon microphone current is derived from the cathode resistors of the 6AQ5 (or 6V6). Gain is controlled by the volume control. The input transformer has a 137 to 1 gain.

FIG I

and actually eliminates some of the need for additional tubes. It is also shielded which makes for less hum pick-up.

This modulator will easily modulate any of the 2E26, 2E24, 832, 6V6, 6L6 class tubes to 100% modulation, and can be built in a 3 x 5" space with no cramped components.

A second modulator which will just about modulate anything up to a 200 watt rig can be built using the same basic circuit. By using a pair of 807's or 1625's in zero bias class B operation a full 120 watts output can be obtained with only three tubes. This circuit was used mobile on an ARC-5 for several years. The trick is to connect the screens and grids of each tube together with a 20,000 ohm resistor and drive the screens instead of the grids. The *plate* modulation transformer from an ARC-5 modulator was used as shown, while the 1625's are obtained almost for free. The output shown in figure II is for push pull or parallel 807's (or 1625's) RF stages, since both will show the same load to the modulator. If another impedance is required you may have to use a different transformer of a multimatch type.

The connection of these modulators to a transmitter is relatively simple. By locating the point within the transmitter where the B plus is supplied only to the final tube or tubes we merely separate this point into two points and insert the output of our modulator between as shown in figure III.

If it can handle the current and is of the correct voltage, the transmitter power supply *can* be *used* to supply the modulator as well.

Shortly after the December issue went to print, a letter from an enterprising young chap arrived at CQ offering a handbook for the BC-1335. Inasmuch as the book is nigh onto

[*Continued on page 94*]

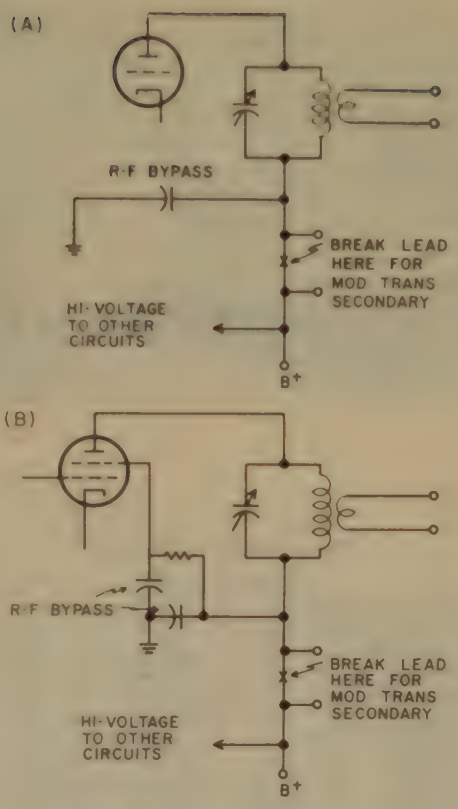
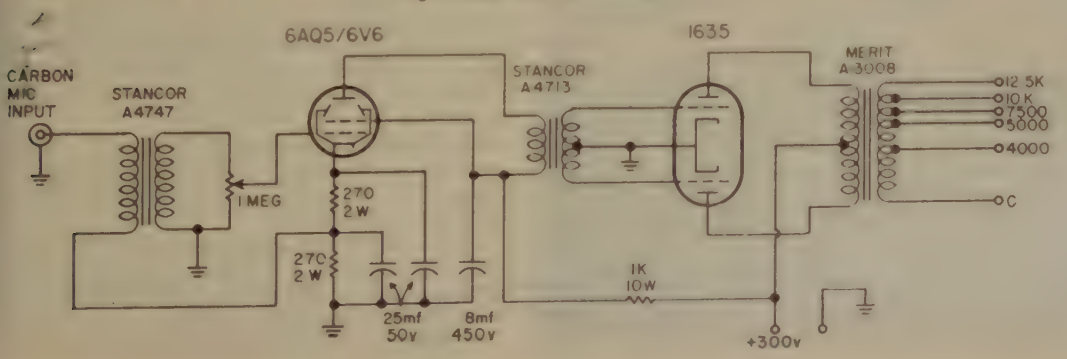


Fig. 3a—Triode circuit connections.

Fig. 3b—Tetrode circuit connections.

Fig. 2—120 watt modulator.



by BOB ADAMS, W3SW
919 McCeney Road, Silver Springs, Md

sideband
sideband
sideband

SIDEBAND

COUNTRIES WORKED
(Two-Way SB)

	*				
W2JXH	97	(81)	W3HN	83	(64)
W4IYC	95	(69)	W6DOB	83	(63)
ZS6KD	93	(58)	W9GPI	83	(75)
W2KR	91	(77)	K6GMA	83	(62)
DL4SV	90	(69)	VE4NI	83	(70)
G3MY	90	(65)	K2AAA	81	(67)
W2EGG	89	(36)	OH2OJ	80	(72)
W3ZP	88	(72)	ZL31A	80	(63)
W2CFT	87	(75)	W3SW	78	(43)
ZL3PJ	87	(70)	HR2WC	78	(66)
W∅QVZ	85	(66)	W2OGE	75	(61)
F7AF	86	(70)	YU1AD	75	(67)
G6LX	86	(61)	W6HIL	75	(59)
K2GMO	83	(67)	(*Indicates confirmations)		

KR6HN, Hal.

As announced last month Harry, W2JXH became the first SB station to work one hundred or more countries on two-way SB, and is now only ten QSLs away from qualifying for the first SB DXCC. Harry who has now worked 105 countries needs on ten cards from any of the following stations: FP8AR, OHØNC, KW6CE, KH6AED/KW6, CE7AY, UA1BZ, PY4APE, PY2BSI, VP2DB, LU7AS, ET2US, ET3GB, HC2AGI, MP4KAM, VS2DB. Harry holds SB-WAC number 1.

Cyril, VK3AEE worked his 100th country on January 2 and is also working hard to obtain all of the verifications. Congrats Cyrl!

The Annual SSB Dinner held each year during the IRE Convention in New York City will be sponsored this year by the Single Side-Band Amateur Radio Association with Harry Whiting, W2JXH as Chairman. Accommodations for more than 800 guests are provided in the beautiful Grand Ballroom of the Hotel New Yorker on March 25th, and tickets cost $7.50. Advance ticket sales indicate a sell-out. You had better send in your check to the SSBARA, 261 Madison Avenue, New York 16, N. Y.

Ted Henry's small 11 pound SB rig is now at VS1EW. VS4JT is active daily from 1130-1230 Z around 14,310 Kc. We welcome VS6AE, Pat to SB.

Wes, SP3DX is active on 144 and 50 Mc SB looking for W contacts. Wes is ex SP3AN. EL4A who has been on SB since August is active on fifteen meters around 1830Z each Tuesday and Friday. QSLs may be sent to W4TO.

MP4KAM, Mohammed is usually found around 14,315. His station is an HT-32, 33 running 1KW into a 3 element beam. QSL to Box 146, Kuwait.

Guy, F8RQ has helped considerably in obtaining permission for Paul, VQ4EO to operate ham radio in the various African Countries he will pass thru on his safari.

W6HIL, W6OZO and W6UPP are engaged

Top to Bottom: KG4AQ, Del. W8MFW, Al. OZ3EA.

a very tight private contest for top SB-DX nors for Orange County, California.

ZD4CF, Hugh has returned to Ghana, hich previously was the Gold Coast, and his w call is 9G1CF. His QTH is: Dr. Hugh e Granville, P.O. Box 4, Winneba, Ghana. D4BF, Joe who used to put such a terrific gnal on the air from the Gold Coast is on e way back to his old location after a six onth's holiday in Guernsey, Channel Islands. e hopes to have his station on the air again February with a new 9G1 call.

Don, W6TNS wrote in to say that CN8FV ill forward all QSLs for Southern Morocco. he QTH is: ARS CN8FV, APO 113, New ork, N. Y.

The Dx-pedition to Monaco by Pat, F7AN nd Dickie, G3IRP on December 2, 3 and 4 st, provided 3A2 contacts for twenty W/K ations and 99 in other countries. Conditions ere not too good during the three days of peration, due chiefly to the location of Mona- which is surrounded with mountains in l directions but to the southeast. The power upply problem was serious as the voltage uctuated to 150 volts causing several rectifier ubes to give up the ghost. The call used was A2BX, and the station was set up in a small hack on the roof of the five story Hotel de eicle. Plenty of fresh air was available as the lass was missing from the windows and the oors of the shack had been removed. Because f this trip Henke, 3A2AH who is a perma- ent resident of Monaco became interested in B and is now on the air with his own rig. he fortunate W/K stations who contacted A2BX were: W2OQO, W6UOU, K2EXF/- O1, W2KR, W4MXI, W6HX/2, W4OPS, /4EUP, W2JXH, K4JOU, W4UKA, W2VZV, /2BXA, K2KGH, K2KGJ, W4WW, W2LV, /1ADM, W3ZP, and W3BWH. The best sig- als heard there were from ZL and VK. A ree-band dipole was used on 10, 15 and 20. KWM-1 and also a 2OA with 4-6AG7s in rounded grid with a 75A4 receiver completed e complement of the station.

A voyage from Florida around the islands the Caribbean on the ninety foot ketch gged steel motor sailer "BAR-L-Rick", owned Harry, W2JSW started off with lots of ists on Saturday, January 11th. Harry's guests cluded Irv, W5HHT, Dan, W2GG/4, Mort, 2KR, Stu, W4HB, and in addition the dar, loran, depth finders, automatic steering, ro pilot, and regular ship to shore radio ar, a KMM-1 was operating into two an- nnas nearly ninety feet above the deck. very one of the guests were taking turns in erating the ham rig while the beautiful ship ith its two GM 6-71 two cycle diesels was

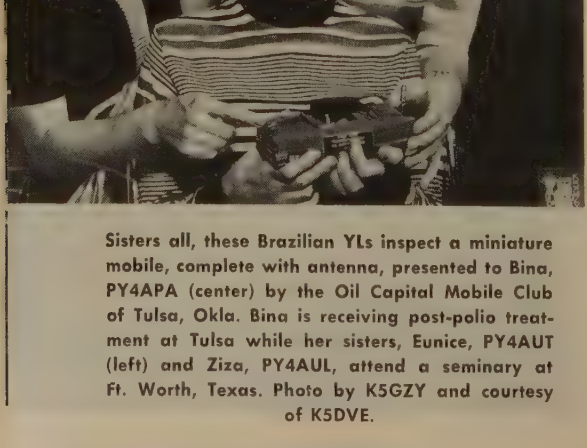
[*Continued on page 96*]

YL

by LOUISA B. SANDO, W5RZ
212 Sombrio Drive, Santa Fe, N. M

Bina, Ziza and Eunice, three charming YLs from Brazil, are currently making an extended visit in W-land. The girls, all sisters and all licensed Hams, hail from Belo Horizonte, Minas, Brazil. Bina, otherwise known as Etelvina Gomes De Oliveira, is PY4APA. She is a post-polio patient in the Hillcrest Hospital in Tulsa, Okla.

Bina contracted polio about nine years ago and at first was paralyzed from the neck down. At the time she arrived in Tulsa last September she was still paralyzed from the waist down. As a result of treatment so far she has regained some use of her lower limbs and will possibly be able to walk with help during the coming year. Those who know her say her determination is terrific.



Sisters all, these Brazilian YLs inspect a miniature mobile, complete with antenna, presented to Bina, PY4APA (center) by the Oil Capital Mobile Club of Tulsa, Okla. Bina is receiving post-polio treatment at Tulsa while her sisters, Eunice, PY4AUT (left) and Ziza, PY4AUL, attend a seminary at Ft. Worth, Texas. Photo by K5GZY and courtesy of K5DVE.

Sisters Eunice, PY4AUT, and Ziza, PY4AUL are students at the Baptist Seminary in Fort Worth, Texas, and plan to be in the U.S. for two years. They visit with Bina during school vacations.

Due to language difficulties (she speaks Portuguese), Bina had a hard time making others understand she was a Ham and would like to meet other Hams. Through a former missionary who had known her and her family in Brazil, she got the idea across. By way of a newspaper reporter, who called the local CD office, her wishes became known to K5DVE, Lou, and her OM, K5DVF, and as Lou says it was a big meeting—for lonesome Bina and for K5DVE also.

Of course the Brazilian YLs cannot operate while in this country, but Bina wanted a receiver so she could listen on the bands. When the mobile club of Tulsa learned of her wish W5VDN provided a receiver and the fellows put up an antenna. Now she listens to the nets, mobiles, etc. and it has helped her in picking up English as well.

In her own country Bina works 40 and 2 meters cw mostly and most of it is DX. She has a stack of DX QSLs that would make many a DXCC seeker green with envy. She holds a Class A license which requires cw at 25 wpm and an additional test on theory. Her transmitter is home built with a pair of 807s; the receiver is an SX-71, and she uses a double antenna. Sisters Eunice, PY4AUT, and Ziza, PY4AUL, hold Class B licenses and work 40 and 80 meters only. Their code (13 wpm) and theory tests are similar to our General Class ones.

In their visits K5DVE and Bina bridge the language barrier with Ham lingo and Q signals when the going gets rough. Another polio patient in the ward also comes to the rescue. Both Pat and Bina speak Spanish—Pat translates in Spanish and Bina understands. CW seems to be a natural "language" with her—both Lou, K5DVE, and Doris, K5BNQ (to both of whom we are indebted for the story of these PY YLs

These YLs from the Houston area attended the TYLRUN celebration at Dallas. L. to r., front row K5BWM, K5ALF, W5ERH, W5ZPD. Standing W5EGD, K5LIU, K5BJU, W5EYE. All TYLRUN photos by W5IWL.

Members of the Dallas YL club, WHOOT, were hostesses for the 3rd anniversary luncheon of the Texas YL Round-Up Net. L. to r., top row: W5YKE, K5GRF, Evelyn Arnold, W5RYX, W5KEC. Middle row: W5WXY, KN5MTF, Dorothy Harrison, W5SPV, K5GHX, KN5MWN. Front row: K5KDY, K5GMI, K5BNH, W5BDB, K5BNB.

Members of the Ft. Worth YL club, WHO, attending the TYLRUN's 3rd anniversary included, l. to r., top row: K5INY, Elizabeth Roden, K5CRH, W5PFU Middle row: K5GFI, KN5LAE, W5IHB, W5FUG, K5HEQ, K5LUA. Front row: Mary Brewer, W5GXG, K5MJW, K5DEF, W5ETH.

Three of the TYLRUN officers for 1957 and other YLs attending the net's 3rd anniversary included, L. to r., front row: K5BNQ, K5LWI, W5LGY, W5FBM. Standing: W5YSJ, K5DVE, K5IMD, W5YRT, K5MBS.

comment that during visits Bina can always be seen tapping out cw with her fingers on the arm of her wheelchair, or even tapping a CQ with one of her feet.

As you can see by the photo, Bina is now mobile in a wheelchair! The Oil Capital Mobile Club of Tulsa presented the miniature mobile (outfitted by W5ZBD) to Bina, along with credentials making her an honorary member of the club. She is hoping to attend some of the club meetings and become acquainted with other Hams in the area. In the meantime, she would be happy to receive a QSL card or a note from any of you who would care to take a few minutes to address one to her. Just send it to Bina, PY4APA, c/o Polio Ward, Hillcrest Hospital, Tulsa, Okla. Or drop in to see her—as Lou puts it, "That little gal will just steal your heart for her personality is as beautiful as her looks!"

9th Annual YL-OM Contest

Don't forget the YL-OM Contest. Phone section: March 1-2; CW: March 15-16. For complete rules check this column in Feb. CQ.

W4UF, Long-Time YL

One of the YLs we missed in the long-time YL series was Dorothy Chapman Saunders who operates W4UF from Englewood, Fla. in winter and W4ZKD at Atlanta, Ga. in summer. Dot got her first license in April, 1927 when a sophomore in H.S. This was at Ridgewood, N. J. and her call was N2BY. With the help of two neighboring Hams they built her gear. The transmitter was a breadboard affair using a 199 receiving tube with input of about 10 watts. Her DX with it, good for that time and power, was Youngstown, Ohio on 40 cw. Increasing to 15 watts power with a 201 tube (raw a.c.), she worked Europe and the U.S. Marines in Nicaragua and Calif.

Dot held her license continuously up through World War II but when the licenses that had been extended automatically expired she was out of the country. When she returned to the U.S. in 1951 she took the license exam again. Now she works 10, 15, 20, 40 and 75 with a Viking Valiant and SX-100 receiver. She also has a mobile rig for CD work on 75 and 40 meters. She enjoys DX and the YL nets and is publicity chairman for the Floridora YLs.

A graduate of Syracuse Univ., Dot took her M.S. and Ph.D. in Biology at the U. of Mich. She is Phi Beta Kappa and Sigma Xi. She has held a pilot's license since 1935 and in 1938-39 was Governor of the middle-eastern section of the U.S. for the 99'ers and editor of their newsletter. In 1930 she became an instructor in the Nat'l Rifle Assn. and an Examiner in Red Cross Lifesaving. She taught 4 years in a girls' college in Penna., lived in Peru for 3 years, has been a research agriculturist with U.S.D.A. in Peru, Ecuador, El Salvador, Cuba and Guatemala. In 1947 Dot married Dr. George Saunders, a research biologist with the U.S. Fish and Wildlife Service and together they did field research in Mexico for several winters. Asst. Prof. of Biology at U. of Fla. in 1953-54, this was followed by a Fullbright post-doctoral research scholarship to Egypt in 1955-56 where Dot worked on blood parasites of fishes of the Red Sea. Since early 1955 she has been research associate at the Cape Haze Marine Laboratory, Placida, Fla.

Dot's other hobbies include playing the piano, violin and alto recorder. She and her OM share a keen interest in photography and have their own laboratory-darkroom. In addition Dot speaks Spanish, French and some Arabic. A full and interesting career, Dot—we all are proud of you!

With the Clubs

The Texas YL Round-Up Net held its third anniversary celebration in Dallas on Nov. 9, 1957 with 55 attending (46 licensed YLs). A come-as-you-are breakfast was served by the YLs of WHO of Ft. Worth. Members of Dallas WHOOT were hostesses for the luncheon at which W5RYX was MC. Speakers included K5BNQ, president and NCS; W5KEC, VP and alternate NCS; W5LGY, sec'y-treas.; and W5YRT, P/C. Officers and WHOOT members wore corsages made of net, leaves, pipe cleaners and 5654's. Tyler, Texas was chosen as the site for 1958's anniversary party. The TYLRUN numbers 77 members and meets on Thurs. mornings on 7235 and 3880.

The Rhode Island Y.L. Club held installation of officers in Nov. with this new slate for 1958: President, K1AAK, Helen; VP, W1WED, Ruth; sec'y, W1GSD, Dorothea; treas., W1OTI, Louise. W1GSD, Dorothea, will be serving as net manager for the club and will conduct a 6-meter YL net Tuesdays at 8:30 p.m. She will tune the entire band in the event YLs from nearby states might like to participate. Look for W1GSD on 51.007, present calling frequency.

The Camellia Capital Chirps have elected these officers for 1958: President, K6ENK, Wanda; VP, W6HTS, Mildred; sec'y, K6UZA, Dorie; treas., K6HHD, Jan; publicity, K6HOI, Pat. The 3C's celebrated their 1st anniversary as a club with a dinner on Jan. 24 at which KL7BEW, Thelma Jean, and her OM KL7ASQ showed colored slides of their experiences in Alaska.

The Penn-Jersey Y.L.A.R. Club has changed the requirements for eligibility for their certificate. Instead of having to work 15 of its members, operators in the U.S. need work only 10 of the Penn-Jersey YLs (DX stations need work only 5 members). No QSLs need be mailed, only a list of stations worked, name, date, band and time. The custodian is W3GTC, Carolyn Currens, P.O. Box 523, Norristown, Penna.

Officers for 1958 for the YLRC/San Francisco are: President, K6HIW, Kay; VP, W6BDE, Esther; sec'y, W6QPV, Rose; treas., K6UDT, Pat. Executive committee: K6CUV, Lee; K6CQL, Joyce; Elsie Bachman and Rose Buckley. The club gave Kay, K6HIW, a number

[*Continued on page 98*]

by FRANK ANZALONE, W1WY
14 Sherwood Road, Stamford, Conn.

ONTEST CALENDAR

March	1- 2	R E F Phone
March	1- 2	YL – OM Phone
March	7- 9	ARRL DX Phone
March	15-16	CQ SSB
March	15-16	YL – OM CW
March	21-23	ARRL DX CW
April	4- 6	DARC WAEDC Phone
April	12-13	R E F CW
May	17-18	Helvetia 22

F

: Phone, 1200 GMT March 1st to 2400 GMT March 2nd.

CW, 1200 GMT April 12th to 2400 GMT April 13th.

l Nrs: The usual progressive 3 digit num- starting with 001 after the RS or RST t.

February issue for scoring, multiplier and details.

your logs to:

Reseau des Emetteurs Francais
B. P. 42 – 01
Paris – RP, France

OM

e 9th annual YL/OM contest is well cov- in Louisa Sando's YL column in the Feb- issue of CQ. Our only comment on this s the poor choice of dates. The conflict the REF Phone contest might present a us threat. However running the CW sec- on the same date as the SSB Contest is not ad inasmuch as different mediums are be- sed.

e first half of the annual ARRL DX party w past history. If you didn't do so good e first half you might be able to catch up in the second half. That's one advantage of having a two week-end contest but I still say it's too long a time for one activity.

DARC

The Phone section is still a month away but if the popularity of the CW contest back in January is any indication, this is worth preparing for by the Phone gang.

Helvetia – 22

This annual party sponsored by the HB Gang, offers an excellent opportunity to work some of those hard to get Cantons. The Helvetia – 22 is a very attractive certificate and really worth making an effort. The HB boys even go to the trouble of operating portable from some of the rare spots during this contest.

VE/W Contest Results

District Leaders

W1JYH	93,571	VE1EK	44,298
K2KFP	56,045	VE2BN	63,450
W3VKD	60,919	VE3DSU	93,390
W4CKD	38,988	VE4SK	21,150
W5LGG	45,324	VE5DZ	19,215
W6NZW	39,965	VE6HG	5,940
W7ENA	9,355	VE7AFP	24,684
W8UVZ	62,888	VE8OJ	16,770
W9NH	63,356	VO2NA	23,100
KØDHH	26,317	KL7MF	298

Gordy Webster, VE2BB, contest chairman, reported that the 1957 contest was the most successful of any held to date. This can be attested by the higher than usual returns and scores. The close battle between W1JYH and VE3DSU for Top Honors would also indicate that Gordy has finally come up with an equitable multiplier. To our knowledge, this is the first time the Trophy has been won by a station on this side of the border. Congratulations Roger.

Next month we hope to have a preliminary report on our own World Wide DX Contest.

BCNU fellows. 73, Frank, W1WY

ham clinic

by CHARLES J. SCHAUERS, W6C

CQ Magazine
300 West 43rd St.
New York 36, N. Y.

A large number of the hundreds of letters received thus far contain requests for information relative to the modification of various commercially made amateur radio transmitters for 6 meter operation. Some of these requests could not be fulfilled because the transmitters in question could not be modified efficiently without major mechanical and electrical changes which most hams are reluctant to make.

In our book, tearing up a beautiful transmitter like the 32V series to add a band is "sacrilegious"! Oh yes, it can be done but we do not think the effort is worth it.

Those who desire the 6 meter band figure this way: "I never use the 160 meter position on the rig so why have it? I'd rather try and convert it over to 6 meters!"

We are willing and able to suggest *general* modification information but we cannot promise detailed schematic treatises. Proper modification is work!

In transmitters such as the DX100, Viking I and II etc., 6 meter conversion can be accomplished without "butchering" up the set, but unless another stage is added, high efficiency will not be realized.

Generally, 6 meter conversion consists of removing 160 meter components (coils, trimmers, by-passes etc.) and replacing them with 6 meter coils etc., which will permit the exciter stages to double and quadruple to 6 meter frequencies. If 25 megacycle crystals are used, modification of the oscillator is usually necessary. Frequency multiplication with 7 or 14 megacycle crystals can only be achieved efficiently by adding a slug-tuned buffer-doubler (quadrupler) stage.

Tapping the final 10 meter coil is not encouraged but can be done. However, for maximum efficiency a separate final 6 meter coil should be utilized and the final *never* operated as a doubler.

Unless special precautions are taken when converting to 6 meters, TVI may be a problem. In addition to regular TVI suppression measures, additional shielding may be necessary; this being especially true if a slug-tuned stage is added.

If you want to get on 6 quickly, tapping down on ten meter coils and upping drive will get you there but at low efficiency. But again, this is not recommended—the danger o "pink ticket" from Uncle FCC for harmo hovers too closely!

Requests are still being received for in mation relative to old equipment for wh we do not have the schematics. We wo therefore appreciate inclusion of schema when inquiring about specific gear. These be returned with your answer. Be sure to clude enough return postage.

You will note that no personal address been included again this month. I am still the throes of moving. If there is a little lon delay in answering letters and cards, ple chalk up the tardiness to "living necessi and not "calculated delinquency."

Observation of the Month

When Collins Radio of Cedar Rapids ca out with their KWM-1 transceiver, amat radio suddenly found itself in a new techni era. Designed for 10, 15 and 20 meters, versatile SSB instrument seems to be at ho in the car as well as the shack.

Operating K6OJO's (Steve) transceiv every station heard and called was worl with glowing reports. The more I opera this "little giant" the more I want one.

Contacting a mid-west station, dial readi were compared and both were RIGHT This surely attests to electrical and mechani perfection!

Although this little and very compact Col package has only 3 bands (because it was sired to keep it small); and requires an adap for "cross frequency" operation, it is just set for the DX enthusiast and those who not want to buy two transmitters and two ceivers for mobile and fixed station operati

Now rumors are rampant that other ma facturers are either in the process of design or coming out with SSB-AM-CW transceiv If true, they will find stiff competition in Collins KWM-1 even though it is not all-ba

This month's observation? Well, as t goes on, radio amateurs will see more rad changes in equipment design which will toward minification and higher efficiency. day of bulky equipment with low stabilit over! Competition, better market research manufacturers and more extensive field tes will enable the average ham to obtain preci

ɔment at prices he can afford.

Twists and Techniques

though most of us never hear of the theft obile radio gear it nevertheless happens frequently. But after seeing some installa- I wonder how a thief could possibly re- mobile components without at least four s time'

hinder and possibly stop the theft of le equipment, W6FQB (Tom) comes up a simple but very effective idea.

a selected bolt which assists in holding ce of equipment to the under dash, steel column or fire-wall, an insulated compres type washer is fitted so that when the bolt rned (from the inside), contact will be to the contact side of the horn relay wire to this compression washer is con- d as carefully as possible

w thieves will "carry on" with an auto blowing full blast and waking up half neighborhood'

ow I would like to see someone come g to invent something to keep mobile na thieves from "lifting" an antenna ned to the spring mount with a "quick nt" connector'

Questions

M. of Springfield wants to know how to nate dynamotor hash and whine. He oper- a command receiver in his car.

ell Lou, the most frequent contributor to is of course dirty commutators and ill- g or worn brushes.

ommutators can be cleaned with crocus with the aid of a piece of soft wood. he commutators are clean, inspect for er brush ride. That is, make sure that hes are seated so that minimum arcing rs and they are free to move. Check for ng brushes.

spect the high and low voltage commuta- for rough uneven wear; perhaps they need reutting on a lathe by an experienced inist skilled in the art.

ter brushes, commutators etc. are in order you still have noise, try a .1 mfd ceramic s each brush to ground. If these do not then you may need a filter (pi type) in s with both high and low voltage output nput terminals.

good sturdy rf choke bypassed with 5 to nfds. will work ok for the high voltage. the low voltage you will need a heavy choke capable of carrying the starting nt and this must be bypassed heavily. In cases, as much as 5000 mfd. (yes, 5000), eeded.

Frequency Drift

have an Allied all-band receiver which s to drift in frequency, especially 10 rs," writes R. C. from New York. Any as to what might be the trouble?

s, check your 6BH8 and OB2 tubes. Also ck your soldered joints. Could be that you may have a bad condenser somewhere too. This is a good little receiver and if put together properly should give relatively little trouble. Even though you got the set second-hand from a friend why not write to Allied and ask them; they may have the exact answer. They have a swell bunch of hams working there.

Regulation

C. H. writes from Australia: "my mains regulation seems to be very poor, especially in the early evening hours. How about my using a transformer which can be switched in and out at will?"

The first thing I would do Carl is to ring up the power company down there and ask them to take a look at my "pole pig" (distribution transformer). If they won't correct the trouble you could use an auto transformer similar to our Variac. However, you would have to be careful that you didn't forget to switch it off, unless of course it is self-regulating. We have that problem sometimes here in the United States too, but usually one call to the power company will bring help.

Portable Power

F. S., Houston, Texas writes: "I'd like to buy a small portable 110 volt ac power supply of about 600 watts output. What would you recommend?"

Personally, I like the 750 watt generator handled by Marco Products Company, Foot of Jones St., Fisherman's Wharf, San Francisco, California. It is only $159.50 and a "steal" for that amount. It weighs only 50 pounds and is indeed a portable. (They advertise in CQ too)

Oscillator Tube

"I've used the good old 6AG7 for years as a reliable crystal oscillator and would like to know if there is a miniature tube that approaches it?" C. B. from Akron, Ohio writes.

Try the 6CL6, Charley.

Receiver Measurements

L. B. of Brownsburg, Ind. writes: "how can the average ham without extensive laboratory facilities measure the sensitivity of a home-built (or other receiver)?"

We are in the throes of getting accurate information from a well known receiver design engineer and will write an article on this subject. We agree that the literature on this subject is not extensive enough for the practical ham who wants to know the answers without having to wade through volumes of engineering data.

So because you suggested the article, we'll ship you an advance copy. We hope you have a screen room!

Schematic

Alvin J. Stewart, Apartado 568, Ciudad Trujillo, Domincan Republic, President of the Adventist Mission there is seeking a schematic for an old Gross radio transmitter, Model CB55, Serial Number 256, phone model. Any-

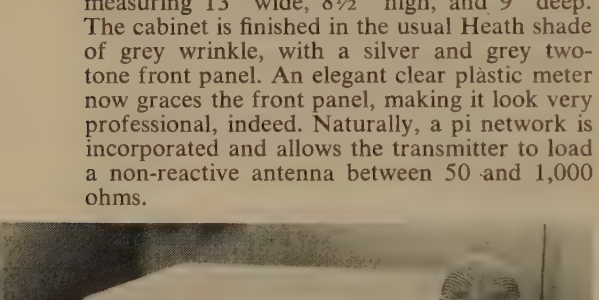
[*Continued on page 112*]

by DONALD L. STONER, W6TI
P.O. Box 137, Ontario, Ca

Novice

I am sure that the new Heath DX-40 will be of particular interest to Novices. Like its famous predecessor, the DX-35, it is a combination phone and cw transmitter. The power, however, has been "beefed up" to 75 watts on cw and 60 watts peak on controlled carrier phone. Since it runs a full "Novice kilowatt," and can be used on phone when the General Class ticket arrives, I am sure that it will be found in many Novice ham shacks.

The DX-40 is the same size as the DX-35, measuring 13" wide, 8½" high, and 9" deep. The cabinet is finished in the usual Heath shade of grey wrinkle, with a silver and grey two-tone front panel. An elegant clear plastic meter now graces the front panel, making it look very professional, indeed. Naturally, a pi network is incorporated and allows the transmitter to load a non-reactive antenna between 50 and 1,000 ohms.



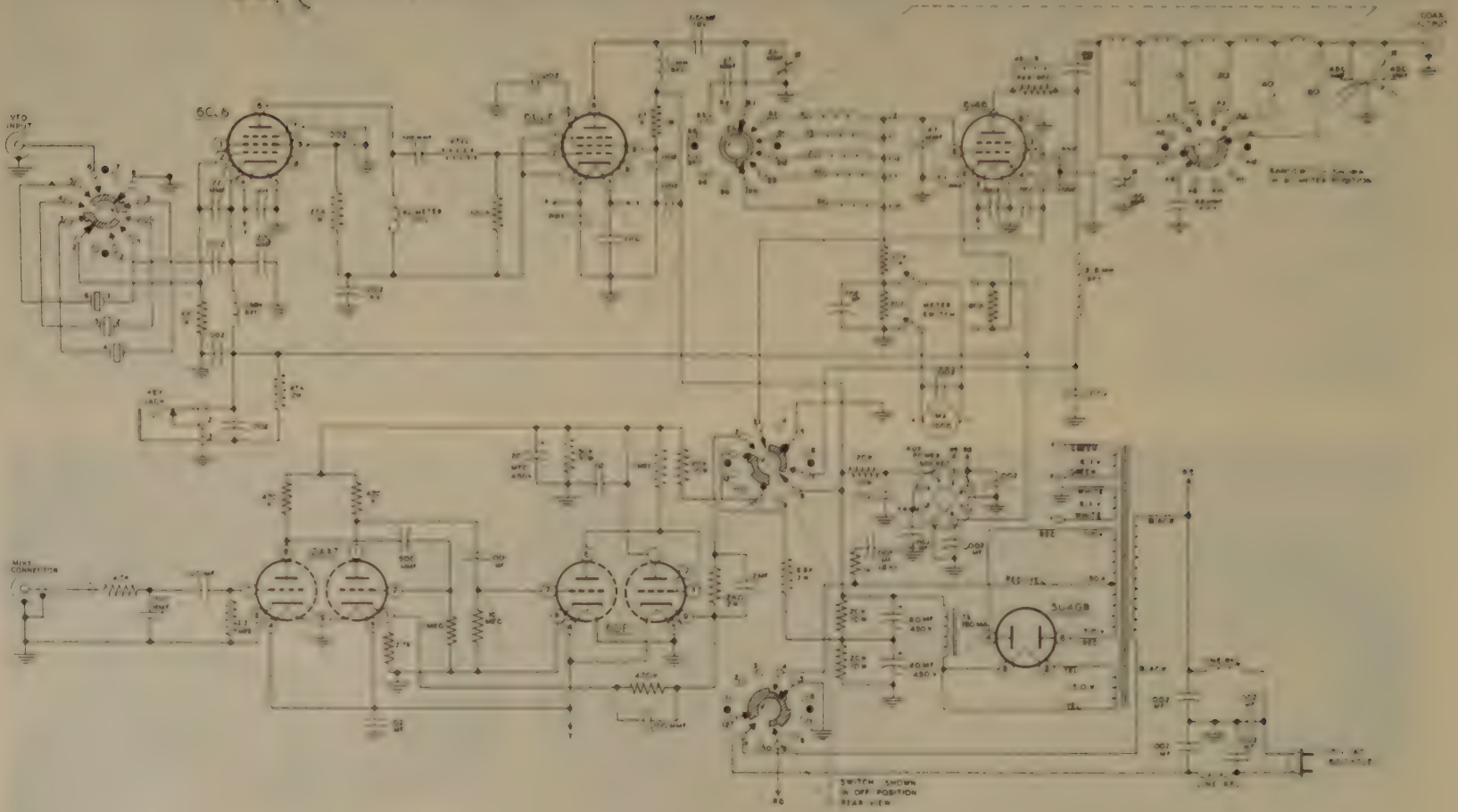
Heathkit DX-40 transmitter

Technically, the transmitter uses 6 tubes including a 5U4GB (a rugged 5U4G). The rf circuitry has been simplified and at the same time improved through the use of newer tube types and the incorporation of design refinements. A 6CL6 tube is used as a Colpitts oscillator and the plate circuit contains a single tank circuit tuned to 40 meters. On lower frequencies, it simply acts as an rf choke. More than adequate drive can be obtained on all bands by using another 6CL6 as a doubler-tripler or quadrupler, as the output frequency demands. In an extremely clever circuit Heath connects both the 6CL6 tubes in a series and they are connected across the 600 volt supply (300 vo each). This eliminates power wasting volta dropping resistors.

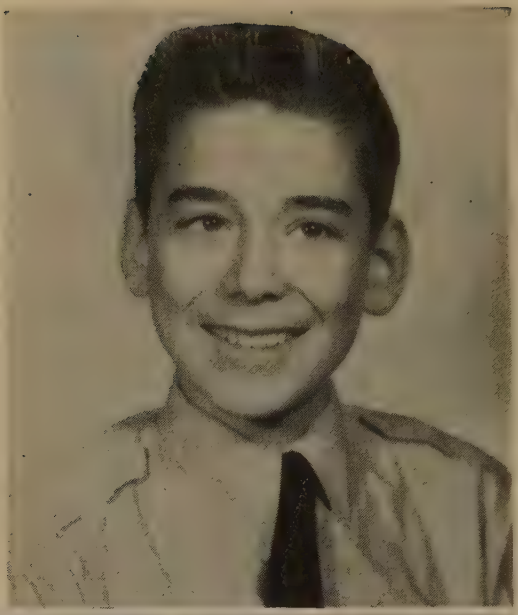
The 6CL6 buffer (or frequency multipli depending on the band) is coupled to the 61 through a pi network similar to the output n work that couples to the antenna. This circ proves to be very effective in reducing televisi interference. Also, this circuit will only reson on the desired ham band, eliminating the p sibility of mis-tuning. Resonance of the 61 grid circuit controls the amount of grid dri Naturally, the 6146 operates "straight throug (it is not used as a doubler on any band).

In the phone section, a 12AX7 tube is us as a high gain two stage resistance coupl speech amplifier. The output of the spee amplifier is coupled to the 6DE7 through a l capacity coupling capacitor. This low capac coupling, along with the 470K and 100 m capacitor forms a feedback circuit from t modulator cathode back to the speech amplif cathode. This shapes the frequency response favor the voice, thus allowing a higher av age level of audio to be maintained. The 6D is a new twin triode containing dissimilar s tions. The driver section (left side) has a watt rating while the right section is rated a watts dissipation. The heavier section is c nected in series with the 6146 screen and conduction varies in accordance with the av age voice level. This varies the 6146 scre voltage causing the tube to draw more or l current. When operated normally, the pl current will kick up to 125 ma from an avera level of 50 ma. The power supply section is tremely husky, and no trouble should be countered here. As a matter of fact, Heath included an accessory socket so that power fr the DX-40 can be used on such accessories the Heath VF-1 VFO.

Heath has included a frequency spotting p tion on the function switch so that you check your position in the band with resp to the other stations. Of particular interest Novices is the keying characteristics. Excell is the only suitable description. It is the fi I have heard short of the more expensive ti sequence keying systems. For the benefit of Generals among us, the audio is crisp and cl It is impossible to tell that the transmitter controlled carrier unless you notice the Meter kicking around. Also, for the Gen ticket holders is the four position switch on rear apron that can select between three

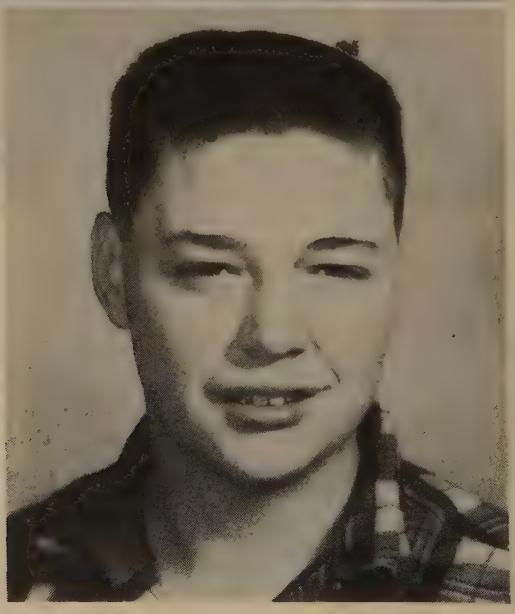


Schematic of the Heathkit DX-40



Frank Gilmore, KNØJPJ-AAØJPJ, Route 2, Box 286A, Springfield, Missouri is the "pres" of a Ham and SWL club and will supply more info to interested parties. He runs a Viking Adventurer and S-85 on 40 and 15, and the DX includes WP4, KH6, VE1-3 WL7, VO2 and an almost YU3! Look for him on 7152 almost every Saturday morning.

Dave Bellama, KN3BIO, 312 Euclid Avenue, Sharon, Penn. has an impressive station. Not shown here is his 75 foot "long" wire antenna and an 80/40 meter WAS total of 30. Look for him on 15 meters soon.



Jack Schwab (KNØLHR), 4124 Warwick, Kansas City 11, Mo. has had the ticket for about four months and has worked 21 states on 7 and 21 mc. His rig is a DX-35 and an AR-2 combination. Jack needs one's and four's for WAS and will be happy to sked anyone needing Mo.

ternal crystals or the external VFO.

The DX-40 leaves the Heath plant for $64.95 plus postage. The editor feels that the $8.00 additional (over the price of the older DX-35) is worth it, just for the new meter alone. You get the increased power for free!

Who's DX

If you have noticed my absence from 40 and 15 meters, it's because I have been on 20-15 and 10 meters trying to drum up dx reports. However, I have been having trouble drumming up dx period! Looks like I'll have to go single sideband!

Our friend Shinji Hasegawa, JA3-1050, #1815-15 Higashi Maiko-cho, Tarumi-ku, Kobe, Japan sends along a list of calls heard in Japan. No dates or times are included. Shinji writes: KN5OLR, KN6AUL, AXY, CNB, DJB, GSD, KJB, YZO, ZZB, WN6FOY, JWS, MZR, NQM, PMC, TJJ, VBK/6, VUH, YND, KN7AAV, AOZ, AZK, ADZ, BBD, BFI, BLW, BRE, BSX, WN7GUK, HAN/6, HVR, HXE, IQM, IYW, ICK, WH6CIZ, CIY/MM, CJC, CJJ, WL7CDY, CEE, CIW, CCO, CBH have been heard. Many thanks, Shinji, for the report. He is currently an SWL, but plans to apply for the amateur examination in January. Good luck. Shinji also writes that CQ Magazine costs 500 Yen in Japan and that it is equivalent to two days wages. . . .

Net News

Gordon Burke, 2224 E. Curtis, Burch Run, Michigan (KN8GHS) informs us of a new net called the Michigan Outer State Net. It meets on Saturdays at 4 PM EST on 7160 kc with the net control on 7158 or 7161 kc.

Terry Lentz, K9EDI, 115 N. Blanche Avenue, Morris, Illinois reminds us about the Midwest Novice Net which meets on 7152 kc at 7 AM CST daily. Terry says the average speed is about 10 wpm except Tuesdays and Fridays

hen the net slows down to four or five wpm. Ken Olsen, KN6COU informs us of the West ast Novice Net with K6SXX as net control, N6YOM as alternate, and KN6COU secre-ry. Roll call is on Saturday at 10 AM PST ith frequencies between 7190 and 7200 with 95 preferred.

Mel Stoller, KN2AOQ, 373 Park Avenue, chester 7, N. Y., fill us in with the details of e Rochester Peanut Whistle Net. The time for tivation is each Sunday night at 2000 EST :00 PM) on 21.15 mc for cw stations, and 00 EST (9:00 PM) for phone stations. All terested parties are invited to check in.

Help Wanted

Tom Van Cleave, 3327 Hlbee St. (?) Eureka, alif. would like to become an amateur and eds help with the code and theory.

Robert Haberern, 230 McKee St., Man-ester, Conn. (13) has a lot of gear ready to , but needs help with the code.

Charles Condie, 1809 Main St., Aliquippa, a. would like to get his feet wet in ham radio, it doesn't know how to go about it. Can any-e help him?

Charles Sayers, Frenchville, Pennsylvania has e gear ready to go but needs a little help with e code and theory.

Tom Martin, RR3, Lake Drive, Greenfield, diana would like to obtain a Novice license id needs help with the code and theory.

Help is offered by the Port City Amateur adio Club, W1WQM, Portsmouth, N. H., Post ffice Box 622, in the form of weekly code and eory classes at 7:30 PM. Classes are held at e club headquarters at 1 Church St., Ports-outh. Ed Ramsdell, W1GXZ, The Publicity hairman watches for letters from that area. fany thanks, Ed.

Letters to the Editor

Bob Lamkin, KN1DIW, (13) 38 Thornton ., Revere, Mass. would like to make skeds ith Vt., Md., Del., N. and S. Dak., Utah, Ariz., daho, Mont., Oreg., and Wyo. Bob runs 50 atts to a DX-20 and operates 15 meters, ostly.

Ben Quinn, KN4QYP, 367 Wallace Avenue, rankfort, Ky., has been on the air for 3½ onths with an SX-99 and a QF-1, plus a lammarlund Four-20 running 45 watts. Ben as worked 25 states. DX includes a VE2 and KN6. He offers to help anyone in the area et their ticket and can be contacted by calling A 7-2726.

Martin Sonn, 79 George Avenue, Norwalk, onn. writes to inquire if the Heath WX-20 an be converted to six in a manner similar to e Knight conversion that appeared in the Aug. 7 Novice column. I see no reason why not, lartin, the same technique should work for oth rigs. It is a matter of supplying 25 mc nergy to the grid of the power amplifier and acing a circuit resonant at 50 mc in the plate rcuit. Increasing the grid leak resistor value ill also increase the output.

Bob and Red Brown, 67 Russell Avenue, Rahway, New Jersey hold the calls KN2ZSQ and KN2ZSP respectively and are a father and son team. They have two home made transmitters and favor 80 meters and use a BC-348-P receiver. The other transmitter is a two meter job with a 2E26 in the final. Bob and Red also add that they have had 900 contacts and filled three log books!

Tom Geiger, WN2KVA, 47 Grandview Avenue, Dobbs Ferry, N. Y. writes to complain about receiving Radio Moscow right smack in the middle of the forty meter Novice band, and 40 is the only band he can operate! Actually, Tom, by international agreement, they have a perfect right to be there. There are many other foreign broadcasting stations in the Novice band but you can't hear them because of the QRM. Overseas hams have a terrible time hearing Novices because of the broadcast stations. I am afraid that your only consolation is that maybe you are QRM'ing them as much as they are QRM'ing you—hi.

Boy, look at those DX cards on the wall of K2TLQ, Bruce D. Jenkins, shack, located on 3797 Redman Road, in Brockport, New York. Although Bruce is now a General, he still likes to work cw especially on 15 meters with his 40 meter dipole. Other antennas include an 80 meter dipole and a 10 meter rotary beam.

Doug Wilson, WN7JDK, 2349 Liberty St., North Bend, Oregon wonders if the "Q" Multiplier similar to that shown in the May 57 Novice column will work on his SW-54. As far as I know Doug, everything including the .001 mf capacitors will be the same.

Bob Ogren, KN1CVH, 931 Pleasant St., New Bedford, Mass. writes the "Exalted One" (Whadde say?) to describe his WRL Globe Chief 90 and NC-98. Bob also wonders about what my station is like. Maybe next month I'll have enough room to include a description of it.

That is about it for this month.

73, Don, W6TNS

by GEORGE JACOBS, W3AS
607 Beacon Road, Silver Spring, M

PROPAGATION

Last minute forecast: March is expected to be a relatively disturbed month. Moderate to severe short wave radio storms are forecast for March 13- 5 and 22-23. Widespread auroral displays are likely to occur during both these disturbances.

March Highlights

An *increase* in the number of long-distant *6-meter* openings between the United States and areas in the Southern Hemisphere is forecast for March. On the other hand, *6-meter* openings to areas of the Northern Hemisphere are expected to *decrease* considerably during the month. Good world-wide DX propagation conditions are forecast to continue on *10-meters* from dawn until several hours past sunset. Excellent conditions are expected on *15-meters* from early morning through the early evening hours, and around-the-clock to some areas of the world. Optimum reception on *20-meters* should occur during the late afternoon, evening, and early morning hours, with the band open more often than during the winter months. Good daytime short-skip conditions are forecast for *40-meters*, with the band opening for DX later in the evening than during the winter months. Fair DX conditions are expected to many areas of the world during the hours of darkness. On *80-meters* daytime skip will be limited to less than 300 miles, increasing as darkness approaches. DX conditions on this band are usually poor during the spring and summer months, but may be possible to some areas of the world during the hours of darkness, when static levels are low. Fairly good propagation conditions are forecast for *160-meters* during the hours of darkness for skip distances up to about 1300 miles. Some openings over greater distances may be possible on a few nights during the month.

During the equinox period, from March through April, there is usually an improvement in *antipodal* propagation—that is, propagation to the opposite side of the world. This improvement should be noticeable on all the amateur bands between *6 and 160-meters*. Australasia, South Africa, and South East Asia are the approximate antipodes of the United States.

Static and atmospheric noise levels begin to increase during the spring months.

Auroral displays are known to occur more often during the equinox period than at any other time of the year. Coincident with this increase in auroral activity is a greater tendency for severe and prolonged radio storms to occur. An increase in auroral type openings in the VHF amateur bands also occurs during this period.

Minor meteor showers are expected to occu March 10-12 and on March 20th.

The smoothed sunspot number forecast fo March, 1958 is 175.

The Zurich Solar Observatory reports a monthly sunspot number of 240 for Decembe 1957, resulting in a smoothed sunspot number of 188 centered on June, 1957.

Short-Skip Chart

A change has been made in the presentation of the *CQ Short-Skip Propagation Chart* this month which should improve their accuracy. Two symbols are now used to indicate the number of days the circuit is expected to open. The first digit indicating the number of days the path is expected to open for the shorter distance range, and the second digit for the longer distance. For example, a *20-meter* opening for the range 750-1300 miles is shown as 5A—7A (2-3). This means that the circuit is forecast to open between 5 to 11 days for distances of 750 miles, and between 12—18 days for distances of 1300 miles. By interpolation, this permits the short-skip forecasts to take into account the variation of MUF with distance with greater accuracy than before.

IGY Progress

A review of the first five months of the United States IGY program has been released recently by the National Academy of Sciences, sponsor of the U.S. International Geophysical Year Committee. This report describes a wide range of early scientific results of this 18-month, international research program of our earth and its environment which began on July 1st, 1957.

The findings reported cover each of the dozen major scientific areas in which IGY programs are being conducted and reflect the work of hundreds of scientists and many participating scientific institutions, including amateur radio. They demonstrate also the constructive participation of many other nations.

The following is a summary of the scientific progress reported in the fields of ionospheric research and radio propagation. Some of this

ogress has already led to revisions in present eories concerning propagation of short wave dio signals.

United States scientists, gathering data at omagnetic field stations in South America, d on several Pacific Islands, have discovered idence of a powerful ring of current, termed e *electro jet* circling the earth high above the uator during magnetic storms. This discovery nds substantial support to the theory that agnetic effects observed in the earth's atmos- here (auroral displays, shortwave radio black- uts, magnetic variations, etc.) are caused by e influence of three great electric currents, perhaps several hundred thousand amperes, elieved to be circling the earth at the North and outh magnetic poles and at the geomagnetic uator.

Further evidence of the simultaneous influ- nce of these powerful currents results from ae work of English scientists studying auroral isplays. They report that simultaneous radar bservations indicate that auroras occur simul- aneously, and with some symmetry, in the orthern and Southern Hemispheres. This ondition was long believed to be true by cientists, but was not previously established ecause of lack of data from the Southern emisphere. Additional polar radio data which rovides further evidence of this has been btained by U.S. scientists.

In another aspect of auroral research, U.S. cientists have for the first time been able to repare synoptic maps for all auroral displays hat occurred over the United States during se latter part of 1957. These maps are being sed by scientists in studying certain charac- eristics of the auroras as well as such related henomena as ionospheric and geomagnetic ffects. Hundreds of *radio amateurs* contributed aluable observational data to this project.

Present theories of ionospheric radio propa- ation claim ultra-violet radiation from the sun s the prime ionizing source of the earth's pper atmosphere. Continuous soundings of he ionosphere over the South Pole, however, ave shown that these ionized layers exist with moderate intensity) through the long inter night and display daily variations de- pite the absence of the sun. Preliminary bservations indicate that certain geomagnetic ctivity, rather than solar radiation, may in ome way be responsible for this ionization. vidence is also available which suggests simi- r ionospheric behavior at the North Pole. nalysis of these observations may appreciably

Several of the 81 rockets fired successfully by the United States during the first five months of the IGY were of the *Rockoon* type shown here. The Rockoon, carried 13½ miles aloft by a 90 foot diameter balloon before firing, travels deep into the lower layers of the ionosphere. Its instruments radio back data concerning ionospheric behavior, the earth's magnetic field, and the aurora.

(Photo Credit: U.S. Navy)

ALL TIMES IN E. S. T.

Eastern USA To:	*6/10 Meters	15 Meters	20 Meters	40/80** Meters
Western Europe	10 A - 2 P (1)*	5 A - 1 P (3)	4 A - 10 A (2)	6 P - 8 P (2)
	5A - 7 A (2)	1 P - 6 P (4)	10A - 1 P (1)	8 P - 1 A (3)
	7A - 4 P (4)	6 P - 10P (3)	1 P - 3 P (2)	1 A - 3 A (2)
	4 P - 7 P (2)	10P - 5 A (2)	3 P - 9 P (4)	8 P - 2 A (2)**
			9 P - 4 A (3)	
Central Europe & European USSR	6 A - 11 A (2)	4 A - 7 A (2)	6 A - 1 P (1)	8 P - 8 P (1)
	11A - 3 P (3)	7 A - 10A (1)	1 P - 6 P (2)	8 P - 12M (2)
	3 P - 5 P (2)	10A - P (4)	6 P - 9 P (4)	12M - 2 A (1)
		1 P - 5 P (3)	9 P - 1 A (3)	11P - 1 A (1)**
		5 P - 9 P (2)	1 A - 6 A (2)	
Eastern Mediterranean	5 A - 10A (2)	1 A - 4 A (1)	7 A - 1 P (1)	7 P - 10P (2)
	10A - 12 N (3)	4 A - 6 A (2)	1 P - 3 P (2)	8 P - 10P (1)**
	12N - 3 P (2)	6 A - 11 A (1)	3 P - 12M (3)	
		11A - 3 P (3)	12M - 7 A (2)	
		3 P - 9 P (2)		
North & Central Africa	9 A - 1 P (1)*	4 A - 11A (2)	7 A - 2 P (1)	6 P - 8 P (2)
	5 A - 7 A (2)	11A - 2 P (3)	2 P - 6 P (2)	8 P - 10P (3)
	7 A - 11A (3)	2 P - 6 P (4)	4 P - 9 P (4)	10P - 12M (2)
	11A - 3 P (4)	6 P - 12M (3)	9 P - 2 A (3)	10P - 12M (1)**
	3 P - 6 P (2)	12M - 4 A (2)	2 A - 7 A (2)	
South America	10A - 1 P (1)*	5 A - 9 A (3)	1 A - 9 A (3)	7 P - 10P (2)
	3 P - 6 P (1)*	9 A - 2 P (2)	9 A - 3 P (2)	10P - 4 A (3)
	5 A - 2 P (3)	2 P - 4 P (3)	3 P - 5 P (3)	4 A - 8 A (2)
	2 P - 6 P (4)	4 P - 10P (4)	5 P - 1 A (4)	10P - 4 A (1)**
	6 P - 10P (3)	10P - 2 A (3)		
	10P - 12M (2)	2 A - 5 A (2)		
Central & South Asia	10A - 12N (2)	7 A - 11A (2)	3 P - 6 P (1)	8 P - 10 P (1)
	12N - 4 P (1)	11A - 4 P (1)	6 P - 11P (2)	5 A - 7 A (1)
	4 P - 7 P (2)	4 P - 7 P (2)	11P - 5 A (1)	
		7 P - 9 P (1)	5 A - 9 A (2)	
Australasia	5 P - 7 P (1)*	8 A - 11A (2)	4 A - 7 A (2)	3 A - 8 A 3
	9 A - 11 A (2)	11A - 4 P (1)	7 A - 9 A (4)	5 A - 7 A 1**
	11A - 3 P (1)	4 P - 7 P (2)	9 A - 7 P (1)	
	3 P - 5 P (2)	7 P - 11P (3)	7 P - 12M (2)	
	5 P - 8 P (3)	11P - 3 A (2)	12M - 4 A (3)	
	8 P - 11P (2)			
Guam & Pacific	4 P - 6 P (1)*	8 A - 12N (2)	7 P - 9 P (1)	10P - 5 A (1)
	10A - 3 P (1)	12N - 3 P (1)	9 P - 3 A (3)	
	3 P - 5 P (2)	3 P - 5 P (2)	3 A - 7 A (2)	
	5 P - 7 P (3)	5 P - 9 P (3)		
	7 P - 9 P (2)	9 P - 12M (2)		
Japan & Far East	3 P - 5 P (2)	8 A - 11A (2)	3 P - 5 P (1)	4 A - 7 A (1)
	5 P - 7 P (3)	3 P - 5 P (2)	5 P - 1 A (2)	
	7 P - 9 P (2)	5 P - 9 P (3)	1 A - 8 A (3)	
		9 P - 1 A (2)	8 A - 9 A (1)	
Antarctica		5 A - 2 P (1)	3 P - 6 P (1)	1 A - 7 A (2)
	5 P - 8 P (2)	2 P - 7 P (2)	6 P - 11P (2)	2 A - 7 A (1)**
	8 P - 12M (1)	7 P - 12M (3)	11P - 5 A (3)	
		12M - 5 A (2)	5 A - 10A (2)	

ALL TIMES IN C. S. T.

Central USA To:	*6/10 Meters	15 Meters	20 Meters	40/80**Meters
Western & Central Europe	10A - 12N (1)*	5 A - 11A (2)	6 A - 12N (1)	7 P - 1 A (2)
	6 A - 8 A (2)	11A - 1 P (3)	12N - 3 P (2)	8 P - 12M (1)**
	8 A - 1 P (4)	1 P - 3 P (4)	3 P - 6 P (4)	
	1 P - 6 P (2)	3 P - 5 P (3)	6 P - 10P (3)	
		5 P - 9 P (2)	10P - 6 A (2)	
Southern Europe & North Africa	10A - 1 P (1)*	4 A - 11A (2)	7 A - 12N (1)	7 P - 12M (2)
	5 A - 7 A (2)	11A - 1 P (3)	12N - 2 P (2)	8 P - 11P (1)**
	7 A - 11A (3)	1 P - 4 P	2 P - 10P (4)	
	11A - 1 P (4)	4 P - 7 P (3)	10P - 3 A (3)	
	1 P - 5 P (2)	7 P - 12M (2)	3 A - 7 A (2)	
Central & South Africa	11A - 3 P (1)*	6 A - 11A (1)	5 A - 12N (1)	6 P - 10P (1)
	5 A - 9 A (2)	11A - 2 P (2)	12N - 3 P (2)	8 P - 10P (1)**
	9 A - 12N (3)	2 P - 7 P (4)	3 P - 8 P (4)	
	12N - 4 P (4)	7 P - 10P (3)	8 P - 12M (3)	
	4 P - 6 P (2)	10P - 6 A (1)	12M - 5 A (2)	
South America	9 A - 12N (1)*	5 A - 9 A (3)	12M - 8 A (3)	7 P - 10P (2)
	3 P - 6 P (1)*	9 A - 2 P (2)	8 A - 2 P (2)	10P - 4 A (3)
	5 A - 2 P (3)	2 P - 4 P (3)	2 P - 5 P (3)	4 A - 7 A (2)
	2 P - 6 P (4)	4 P - 10P (4)	5 P - 12M (4)	8 P - 3 A (1)**
	6 P - 10P (3)	10P - 1 A (3)		
	10P - 12M (2)	1 A - 5 A (2)		
Japan & Far East	2 P - 4 P (2)	7 A - 11 A (2)	6 A - 8 A (3)	12M - 7 A (1)
	4 P - 7 P (3)	1 P - 3 P (2)	8 A - 2 P (1)	
	7 P - 9 P (2)	3 P - 9 P (3)	2 P - 9 P (2)	
		9 P - 12M (2)	9 P - 1 A (3)	
			1 A - 6 A (2)	
Central & South Asia	8 A - 11A (2)	7 A - 12N (2)	3 P - 10P (2)	NIL
	11A - 2 P (1)	12N - 3 P (1)	10P - 5 A (1)	
	2 P - 4 P (2)	3 P - 9 P (3)	5 A - 8 A (2)	
	4 P - 6 P (3)	9 P - 12M (1)		
	6 P - 9 P (2)			
Hawaii	2 P - 5 P (2)*	9 A - 3 P (3)	9 A - 3 P (2)	8 P - 10P (2)
	9 A - 11A (2)	3 P - 11P (4)	3 P - 6 P (3)	10P - 6 A (4)
	11A - 8 P (4)	11P - 3 A (3)	6 P - 4 A (4)	6 A - 8 A (2)
	8 P - 10P (3)	3 A - 5 A (2)	4 A - 9 A (3)	11P - 6 A (3)**
	10P - 12M (2)			
Australasia	4 P - 7 P (1)*	7 A - 9 A (3)	5 P - 8 P (2)	1 A - 8 A (3)
	8 A - 11A (3)	9 A - 3 P (2)	8 P - 12M (3)	2 A - 7 A (2)**
	11A - 4 P (2)	3 P - 7 P (3)	12M - 8 A (4)	
	4 P - 8 P (4)	7 P - 11P (4)	8 A - 10A (2)	
	8 P - 10P (2)	11P - 4 A (2)	10A - 5 P (1)	
Antarctica	12N - 2 P (1)	5 A - 12N (1)	3 P - 6 P (1)	12M - 7 A (2)
	2 P - 8 P (3)	12N - 6 P (2)	6 P - 9 P (2)	1 A - 6 A (1)**
	8 P - 1 P (2)	6 P - 12M (3)	9 P - 4 A (3)	
		12M - 5 A (2)	4 A - 9 A (2)	

ALL TIMES IN P. S. T.

Western USA To:	*6/10 Meters	15 Meters	20 Meters	40/80**Meters
Europe & North Africa	6 A - 9 A (2)	6 A - 9 A (2)	11A - 1 P (2)	7 P - 11P (1)
	9 A - 1 P (3)	9 A - 1 P (3)	1 P - 9 P (3)	8 P - 10P (1)*
	1 P - 3 P (2)	1 P - 10P (2)	9 P - 3 A (2)	
			3 A - 11A (1)	
Central & South Africa	10A - 3 P (1)*	6 A - 10A (1)	12N - 2 P (1)	7 P - 10P (1)
	6 A - 10 A (2)	10A - 1 P (2)	2 P - 5 P (2)	
	10A - 1 P (3)	1 P - 3 P (3)	5 P - 10P (4)	
	1 P - 6 P (4)	3 P - 8 P (4)	10P - 12M (2)	
	6 P - 8 P (2)	8 P - 1 A (2)		
South America	10A - 1 P (2)*	12M - 8 A (3)	8 A - 2 P (1)	6 P - 10P (2)
	4 P - 7 P (1)*	8 A - 1 P (2)	2 P - 4 P (2)	10P - 2 A (3)
	5 A - 12N (3)	1 P - 3 P (3)	4 P - 6 P (3)	2A - 6 A (2)
	12N - 4 P (4)	3 P - 12M (4)	6 P - 2 A (5)	8 P - 1 A (1)**
	4 P - 8 P (3)		2 A - 4 A (4)	
	8 P - 11P (2)		4 A - 8 A (3)	
Guam & Pacific Islands	1 P - 5 P (1)*	8 A - 12N (3)	8 P - 10P (2)	1 A - 5 A (2)
	9 A - 1 P (3)	12N - 6 P (1)	10P - 4 A (4)	2 A - 4 A (1)**
	1 P - 5 P (2)	6 P - 12M (3)	4 A - 8 A (3)	
	5 P - 7 P (4)	12M - 3 A (2)	8 A - 10A (2)	
	7 P - 10P (2)			
Australasia	2 P - 5 P (2)*	7 A - 12N (3)	5 A - 9 A (3)	1 A - 4 A (2)
	8 A - 12N (3)	12N - 6 P (1)	9 A - 12N (2)	4 A - 7 A (3)
	12N - 6 P (2)	6 P - 1 A (4)	12N - 9 P (1)	4 A - 6 A (2)**
	6 P - 10P (4)	1 A - 7 A (2)	9 P - 12M (2)	
	10P - 12M (2)		12M - 5 A (4)	
Japan, Okinawa, & Far East	3 P - 6 P (1)*	11A - 1 P (2)	8 P - 11P (2)	1 A - 4 A (2)
	11A - 2 P (2)	1 P - 5 P (3)	11P - 3 A (4)	4 A - 6 A 3)
	2 P - 8 P (4)	5 P - 7 P (4)	3 A - 7 A (3)	1 A - 5 A (1)**
	8 P - 11P (2)	7 P - 11P (2)	7 A - 9 A (4)	
		11P - 2 A (2)	9 A - 12N (3)	
			12N - 6 P (1)	
Philippine Islands & East Indies	1 P - 4 P (1)*	8 A - 12N (3)	12M - 2 A (1)	3 A - 6 A (1)
	8 A - 12N (1)	12N - 6 P (1)	2 A - 6 A (3)	
	12N - 4 P (3)	8 P - 12M (2)	6 A - 11A (2)	
	4 P - 10P (2)	12M - 4 A (1)	11A - 2 P (1)	
Malaya & South East Asia	8 A - 12N (3)	7 A - 1 P (3)	12M - 3 A (1)	4 A - 7 A (1)
	12N - 2 P (1)	1 P - 4 P (2)	3 A - 6 A (2)	
	2 P - 7 P (2)	4 P - 9 P (1)	6 A - 8 A (3)	
	7 P - 9 P (3)	9 P - 2 A (2)	8 A - 11A (2)	
	9 P - 11P (1)			
Hong Kong, Macao, & Formosa	3 P - 6 P (1)*	7 A - 9 A (3)	12M - 4 A (4)	3 A - 6 A (2)
	12N - 8 P (3)	9 A - 7 P (2)	4 A - 9 A (3)	4 A - 6 A (1)**
	8 P - 10P (2)	7 P - 12M (3)	9 A - 11A (2)	
		12M - 4 A (2)	11A - 7 P (1)	
			7 P - 12M (3)	

CQ PROPAGATION CHART (SHORT-SKIP)

Band (Meters)	Distance (Miles) 50-250	250-750	750-1300	1300-2400
10			9 A - 12N (1-3)	12N - 4 P (1)*
			12N - 3 P (2-4)	7 A - 10A (2)
			3 P - 8 P (1-3)	10A - 5 P (4)
				5 P - 9 P (2-3)
15		11A - 4 P (0-2)	7 A - 10A (2-3)	7 A - 1 P (3)
			10A - 4 P (4-5)	1 P - 8 P (4)
			4 P - 9 P (2-3)	8 P - 11P (2-3)
				11P - 1 A (1-2)
20	9 A - 11A (1-2)	7A-10A (1-3)	5 A - 7 A (2-3)	4 P - 11P (5)
	11A - 3 P (2-3)	10A - 4 P (4)	7 A - 4 P (4)	11P - 1 A (3-4)
	3 P - 5 P (1-2)	4 P - 8 P (2-3)	4 P - 8 P (5)	1 A - 7 A (2-3)
		8 P - 10P (0-1)	8 P - 3 A (2-3)	7 A - 9 A (4)
				9 A - 4 P (3-2)
40	2 A - 6 A (1-2)	6 A - 10A (5-3)	6 P - 8 P (4-3)	3 P - 7 P (2-1)
	6 A - 8 A (3)	10A - 4 P (3-2)	8 P - 6 A (5)	7 P - 6 A (4-3)
	8 A - 10P (5)	4 P - 12M (5-4)	6 A - 9 A (4-3)	6 A - 9 A (2)
	10P - 2 A (2-3)	12M - 6 A (2-3)	9 A - 4 P (2-1)	
			4 P - 6 P (3-2)	
80	8 A - 11P (4-3)	8 A - 5 P (2-1)	6 P - 8 P (2-1)	5 P - 8 P (2-1)
	11P - 4 P (3-2)	5 P - 7 P (3-2)	8 P - 6 A (4)	8 P - 4 A (4-3)
	4 P - 7 P (4-3)	7 P - 5 A (5)	6 A - 8 A (2-1)	4 A - 8 A (2)
	7 P - 8 A (5)	5 A - 8 A (4-3)		
160	5 P - 7 P (2)	6 P - 8 P (2)	6 P - 8 P (2-1)	9 P - 5A (2-1)
	7 P - 7 A (5)	8 P - 5 A (5-4)	8 P - 4 A (3)	
	7 A - 9 A (2)	5 A - 7 A (4-2)	4 A - 6 A (2)	

SYMBOLS FOR NUMBER OF DAYS CIRCUIT FORECAST TO OPEN:

(1) 1-4 days (2) 5-11 days (3) 12-18 days (4) 19-26 days (5) over 26 days

*Indicates time of possible six-meter openings
**Indicates time of possible eighty-meter openings

Time Symbols: A - A. M. N - Noon
P - P. M M - Midnight

The CQ DX Propagation Charts are based upon a CW radiated power of 150 watts at radi angles less than thirty degrees and are centered on the Eastern, Central and Western a of the USA. The DX forecasts are valid through April 15, 1958. The CQ Short-Skip Pro pagation Chart is based upon a radiated CW power of 75 watts, using a dipole antenna a wave length above ground. This Chart is valid through April 30, 1958. All forecasts ar based upon ionospheric data published by the Central Radio Propagation Laboratory of t National Bureau of Standards, Boulder, Colorado.

alter present concepts of the process of ioniza tion in the earth's atmosphere.

During the first five months of the IGY the United States successfully fired 81 tes rockets high into the earth's atmosphere. Man of these rockets were used to investigate ion

[*Continued on page 110*]

transistors

by DONALD L. STONER, W6TNS
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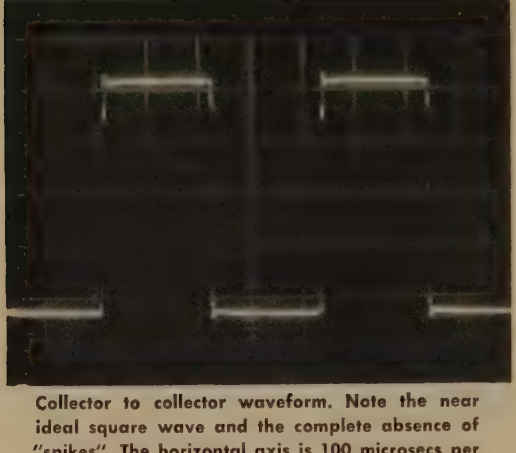
Transistorized Mobile Power Supplies

Transistorized power converters are the hot-
est item to hit the amateur mobile market since
he PE-103's were unloaded right after WW II.
everal companies are already offering the
ransistorized supplies to amateurs and one
rominent manufacturer sells such a supply for
se with their mobile rig.

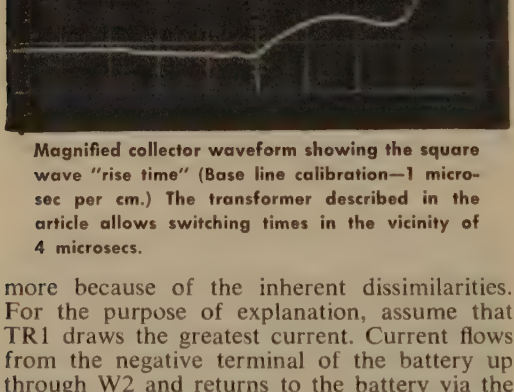
Why all the excitement about these supplies,
ou might ask. First, and foremost, there are
o moving parts. This means no more burnt
nd pitted vibrators to replace. Second, the con-
ersion efficiency is extremely high. The theor-
ical maximum is 96% with 92% being a
ood figure for a 28 volt supply. Twelve volt
nits get up to 86%, or so. Compare this with
our old PE-103 (about 52%) or a new vibra-
ack (66%, roughly)! To illustrate how impor-
nt this can be to you, assume that you are
sing a PE-103 and your mobile rig consumes
5 amps from the 12 volt battery. If you were
substitute the above mentioned 12 volt
ansistorized converter, the battery power con-
mption would be only slightly over 15 amps!
o matter how husky your battery is, 10 amps.
a worthwhile saving. Another feature of the
ew supplies is that they generate no hash be-
use no contact is broken. Instant starting plus
rfect overload protection is also on the "credit
de of the ledger". If you should develop a short
overload in your mobile rig the supply in-
ntly reverts to its stable state. No smoke, no
e, and no fuses blown.

How It Works

To see how all these marvels came about,
's examine the workings of a simplified transistorized power supply (Fig 1). You will no doubt immediately recognize the similarity to a common vibrator power supply, however transistors have replaced the vibrating reed. Connected in this manner, the circuit represents a *magnetically coupled multivibrator*. The battery voltage and the transformer winding details determine the *free running frequency*. The action of the circuit is as follows: When switch S1 is closed one transistor will conduct



Collector to collector waveform. Note the near ideal square wave and the complete absence of "spikes". The horizontal axis is 100 microsecs per cm. (2.3 Kc) while the vertical calibration is 10 volts per cm.



Magnified collector waveform showing the square wave "rise time" (Base line calibration—1 microsec per cm.) The transformer described in the article allows switching times in the vicinity of 4 microsecs.

more because of the inherent dissimilarities. For the purpose of explanation, assume that TR1 draws the greatest current. Current flows from the negative terminal of the battery up through W2 and returns to the battery via the collector and emitter of TR1. This in turn induces an opposite voltage in W1 of the correct polarity to make the transistors draw more current. Almost instantly the transistor and the core are in a state of *saturation* i.e. the transistor can pass no greater amount of current and maximum flux density occurs in the transformer. Since the lines of force are no longer moving, no voltage is induced in W1 and the current through TR1 starts to decrease. The decreasing current in W2 now induces an opposite current in W4, causing TR2 to increase conduction. As before, the increased current in W3 causes TR2 to draw even more current because of the inducted voltage in W4. This transistor instantly saturates causing maximum current to flow in W3. This action repeats at a very high speed as long as S1 is closed. It should be noted that the transformer de-saturation does not occur instantly, in fact, compared to the actual switching time, it stays saturated for quite a while. A typical supply might switch in 6 microseconds, yet stay saturated for 1,000 microseconds. To simplify the preceding action you might imagine the transistors as a single pole, double throw toggle switch connected in such a manner so as to place the battery across W2 and W3 alternately. The current flowing through W2 and W3 also induces a near perfect *square wave* in the secondary (W5).

Now, let's see "what we got for our money". The transistors can switch many, many times faster than a vibrator. A typical vibrator runs about 120 cycles, yet transistors work quite nicely at one or two kilocycles. This means that a suitable filter would be a one or two mf paper capacitor rather than the 20 to 40 mf usually encountered. Also, since the transformer need not have any low frequency response a much smaller core area can be used. No doubt 400 cycle transformers (powdered iron core) could be used.

What Transistors?

If you have been following transistor ads, you may have noted the one, two, five, and ten watt ratings. You put two and two together and ask, "How can a pair of two watt transistors switch 30 watts of dc?" Usually, there is "no free lunch" in electronics, but this is an exception. A good rule of thumb is that a transistor can switch eight times its class A power output rating. Assume that the supply shown in fig 1 used a pair of 2 watt transistors. Eight times two watts is 16 multiplied by two transistors is 32 watts. An output rectifier system could easily supply 300 volts at 100 ma (30 watts) or 150 volts at 200 ma and so on. Two watt transistors such as the Sylvania 2N307 or the CBS 2N256 should work nicely and the more exotic RCA 2N301 is capable of even more. For transmitters, the Delco or Honeywell "brutes" would be used. A pair of Delco 2N174's will switch 660 watts! The foregoing rule of thumb assumes that a suitable heat sink is used to dissipate the transistor heat.

Transistors can take the beating because of the fast switching time. The thing that ruins the transistors is heat, and heat is created by IR losses inside the junction. When the transistor is saturated (conducting) the junction has virtually no resistance and no voltage can be dropped internally. Conversely, when the transistor is cut-off the junction represents an extremely high resistance so that only a tiny current can flow. In both the saturated and cut-off state, the transistor dissipates a minimum of power and generates a minimum of heat. Therefore, it is reasonable to assume that the faster we switch from on to off or visa versa, the lower the junction temperature will be. Use of a saturable core transformer allows a much faster switching time than a regular iron core. The square wave *rise time* (and fall time) is a good measure of how well the supply is working.

Winding a Transformer

The operating frequency of the supply is not t arbitrary matter. As the frequency is raised, e rise time is a greater part of the saturation ne and the *transition loss* is greater. At higher equencies, the cores tend to become meth- nt and *core losses* increase. The *copper loss*, owever, decreases sharply with higher operat- g frequencies. If all these losses are plotted a graph one frequency will produce minimum tal power loss. Naturally, this point is the erating frequency. I have found the design equency of two kilocycles very successful for *pe wound cores*. Once the supply is operating, e best frequency can be found empirically.

For the purposes of explanation, let's apply e formula in fig 2 and design a transformer r a hypothetical power supply. A 300 volt, 0 ma receiver power supply would be most etul with a 12 volt automobile battery, so t's build it for that. An RCA 2N301 can eas- switch 40 watts and they will make an ideal itch for the supply. It should be noted that e transistor *must* have a breakdown voltage *at least twice* the supply voltage.

The core. Arnold Engineering "Deltamax" res have been used by the author in several ccessful power supplies. The cores are made winding a 2 mil thick special alloy tape into spiral core. Fig 2 also illustrates the method f calculating the *cross sectional core area*. An rnold T5233-D2 core was selected for the pply. This core has the following dimensions .D.-1.5", I.D.-.375" and H-.5" and equals 94 square inches cross section area. The ther thing that we need to know about the re is the maximum flux density (Ø is the turation flux and is measured in gauss). rnold Bulletin TC-101A lists the properties "Deltamax" as having a peak flux density etween 13,500 and 15,500 with a 14,000 gauss minal. Now that we have all the parts of ur equation, let's solve it.

$$N = \frac{E \times 10^8}{12.9 F A \emptyset}$$

$$N_c = \frac{12 \times 10^8}{12.9 \times 2{,}000 \times .094 \times 14{,}000}$$

$$N_c = \frac{12}{12.9 \times 2{,}000 \times .094 \times .00014}$$

$$N_c = 35 \text{ turns}$$

nd so for our supply we find that the collector inding should have 35 turns. It will also be ecessary to place a center-tap on this winding or the power connection (see fig 3). The wire ze for the windings is not critical but it should e known within two or three wire sizes. If he supply is to deliver 30 watts and has an stimated efficiency of 85% then roughly 36 atts or three amperes will be consumed from he 12 volt battery. On the basis of 1500 cir- ular mils per ampere, The Radio Handbook ire table recommends #13 wire. Number 14 ould work with slightly less efficiency and 12 would produce slightly more.

The next step in designing the transformer is to calculate how many turns will be needed in the base winding to sustain oscillation. The formula for this winding is:

$$N_b = \frac{N_c \times 2V_b}{2E}$$

N_c = total turns on collector winding

V_b = base voltage required for saturation

E = supply voltage

Referring to the characteristic curves for the 2N301 tells us that 3.5 volts will saturate the transistor with one volt on the collector. Therefore:

$$N_b \frac{(35)\ 2\ (3.5)}{24}$$

N_b 10 turns (round numbers)

Now we are heading down the home stretch. Hope I didn't lose you on any of the turns (no pun intended). The final winding is the step-up secondary winding. This winding delivers the high voltage square wave to the rectifier system. Referring to the original parameters, remember that the supply was designed for 300 volts. Because voltage will be lost in the wire (IR Loss) and some will be lost in the rectifier (two volts for silicons, 30 volts or more for vacuum tubes) let's plan on developing 310 volts. The formula for the secondary winding is:

$$N_s = \frac{N_c \times E_o}{2E}$$

E_o = output voltage

$$N_s = \frac{35\ (310)}{24}$$

$N_s = 452$ turns

A center top can be placed on this winding to provide an additional 150 volt output (see fig 3).

And so, if you are not reading the want ads by now, you and I have designed a transistor power supply transformer. The wire sizes for the base and secondary windings can be found in the wire table as per the Radio Handbook. The base winding will carry about 100 ma and #26 wire should be quite suitable. The secondary winding also carries 100 ma and the same wire is usable here also. Because of the on-off duty cycle, the wire sizes will be quite conservative. Fig 3 is a circuit suitable for use with our "newly born" transformer. The accompanying photo shows the finished transformer, along with a new commercial unit.

Bias

It was stated earlier that fig 1 was a simplified circuit, and so it was. Actually it would never start oscillating with any load. Transistors must be *forward biased* before they will start to conduct. Vacuum tubes, however, must be biased or they draw too much current. Resistors R1 and R2 in fig 3 perform this function. It was also stated earlier that the output could be shorted without harming the supply.

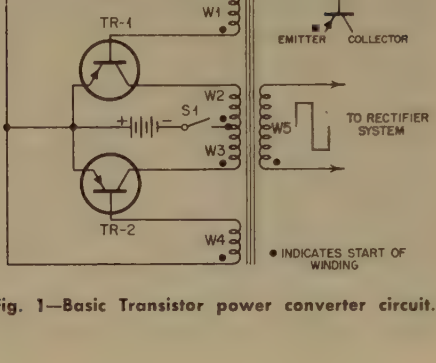


Fig. 1—Basic Transistor power converter circuit.

$$N_{COI} = \frac{E \times 10^8}{12.9\ F\ A\ \varnothing}$$

where:

A = cross sectional area of core in square inches
E = battery voltage
F = operating frequency in cycles
$\varnothing$ = saturation flux of core in gauss
N_{COI} = total turns in collector winding

Fig. 2 — Formula for calculating the number of turns for a transistorized power converter transformer.

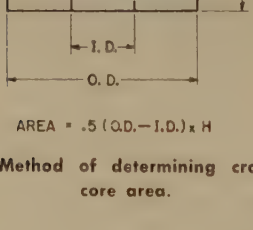


Fig. 2a — Method of determining cross section core area.

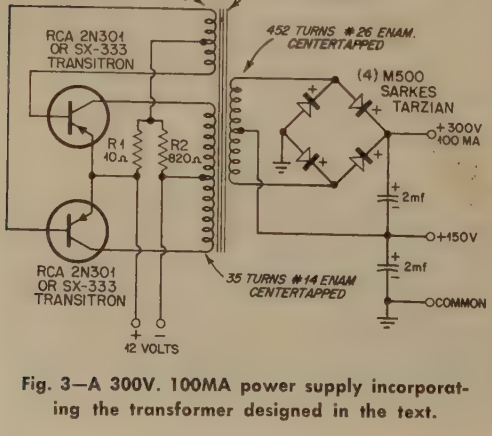


Fig. 3—A 300V. 100MA power supply incorporating the transformer designed in the text.

The reason is this: When the output is shorted there will not be enough voltage induced in the base windings to sustain oscillation. The transistors will revert to a static current determined by the values of R1 and R2. These resistors should be adjusted so that the transistors draw just under their maximum class A rating with the secondary shorted. The circuit shown in fig 3 draws about 240 ma with the secondary shorted.

It should be noted that the greatest efficiency will occur at the design point. The supply shown in fig 3 has an efficiency of 86% at 100 ma. The primary drain was 2.84 amperes or 34 watts. However if the secondary load is reduced to 50 ma, the primary current will only drop to 2.2 amperes or 57% efficiency. Load 'em heavy for best efficiency.

Winding the Toroid Core

I have found the easiest way to wind these toroids is to wind up wire of the correct size on a pencil and use this for a *shuttle*. The shuttle is passed through the core in smooth successive turns. Try to plan the winding to make one "pass" around the core. In other words, the end of a winding should be adjacent to the start of the same winding. Wind on the secondary first, then the base winding, and last, the collector winding. The tighter the turns are wound, the less wire will be needed and the IR loss will be lower. A good grade of transformer tape, or glass tape should be used to secure the windings. Plastic tapes usually "skid" or slide after they have been warm for a while, and should be avoided.

A Transistorized Power Converter

To test our newly designed transformer, an extremely compact transistor power converter was constructed in a 2" x 3" x 5¼" chassis box (LMB #136). The transformer, with an outside diameter of two inches fits easily into one end of the box. The paint was removed from the center area of the box with the aid of sandpaper and steel wool. A steel rule held at the edge of the area to be cleaned produces a sharp smooth line. The transistors were mounted and insulated as described under "Thermal Considerations". Four Sarkes Tarzian M500 silicon rectifiers form a full wave bridge rectifier. These rectifiers, along with a midget Winchester power connector were mounted at the other end of the chassis box. The filter capacitors are mounted between two #202 terminal strips, along with the bias resistors. Note that the filter capacitors are connected in series between the 300 volt output, the 150 volt tap, and ground. This equalizes the voltage across each capacitor. Although metalized capacitors were used, 250 volt electrolytics will work just as well. Another point of interest to constructors is the method of connecting to the 2N301 emitter and base pins. A seven pin molded bakelite socket was smashed, and the pins removed. These pins will slide on to the transistor connections and

rovide excellent contact.

When the output of the supply is shorted, nd power applied, the transistors should draw bout 100 ma if the bias resistors are correct. mmediately upon removing the short, the sup- ly should "take off" and emit a high pitch scream". If it does not start to oscillate im- ediately, increase the 10 ohm resistor to 15 hms. It will make the static current higher, ut will not affect the performance. If it still oes not start, reverse the base connections. It hould then start easily. One last tip to those onstructing the supply. *Do not*, I say again, *o not* reverse the polarity of the 12 volt sup- ly. *If you do*, it will result in immediate, bsolute, final and complete *destruction* of the ransistors.

Thermal Considerations

Because some power will always be lost in he internal resistance of the transistors, they re bound to produce heat. It seems quite rea- onable to assume that the more heat removed rom the transistor, the "harder" they can be perated. Almost always, the manufacturers ttings specify a particular "heat sink" area. *heat sink* usually consists of bolting the ransistors to an aluminum or copper plate. he plate conducts heat away from the transis- or and lowers the junction temperature. In any circuits (including the transistorized ower supply) this is impossible because a hort circuit would be created between the ollectors, which are connected internally to he mounting flange. It is necessary to provide he transistors with a low thermal resistance nd a high electrical resistance. This can be ecomplished in one of several ways.

One common method is to insert a thin sheet f mica between the transistor and the chassis. y thin, I mean approximately two thousands two mils). This is the method used in the onstruction project this month. A sheet of wo mil mica was placed on the flat surface f the transistor and then it was bolted *securely* o the chassis. The resistance was then checked ith a high range ohmmeter. It should meas- re at least 200 megohms in dry air. If you ave any trouble with shorts check the surface f the transistor and the chassis to make sure hey are flat and have *no* burrs. Feathering the dges of the holes with steel wool will remove hem, if present. After it has been determined hat no shorts exist, spray Krylon (clear plastic pray) on the transistors and the chassis to revent oxidation.

Another method, which I prefer (but is omewhat more difficult), is the use of ano- ized aluminum washers. First saw a washer he same size as the mounting flange from a heet of ⅛ inch aluminum. After drilling and e-burring, send the washers to a metal proc- ssing company and have them anodized. This rocess places a very thin film of aluminum xide on the surface of the washer that will ithstand at least 100 volts. The thermal con- ductivity is somewhat better than the mica washer. Mica, however was used in the con- struction process because it is easier to obtain and does not require such careful de-burring. Actually, I used mica that had been removed from an old transmitting capacitor. There are many other sources of mica, such as old flat iron heating elements and stove fronts (put down that hammer, son!). To obtain the de- sired thickness, try slicing the mica endwise with a razor blade or a sharp pen knife. It works! Keep cutting the sheet in half endwise and check with a micrometer until the desired thickness is obtained. This is not recommended for the heavy smokers and drinkers, but with a little practice *almost anyone* can do it.

One other thermal problem rears its ugly head and that is the transformer core. The cor- rect size will depend on the power rating and it will increase proportionally. The *core volume* dissipates the heat. The temperature rise of the power transformer in the construction project was quite mild. The volume of this core can be scaled up to suit higher wattage power sup- plies. Core manufacturers will usually help you select the proper core size.

The temperature of the silicon rectifiers is only slightly higher than ambient. However in supplies where the current is near the 500 ma maximum rating of these rectifiers, they should be well ventilated.

A Commercial Transformer

A list of some of the many core manufac- turers is included at the end of the text if you are interested in "rolling your own". Triad Transformer Corporation realizing the tremen- dous potential of the transistorized power sup- plies (no pun intended) has developed a trans- former for this application. This unit is known as the TY-69S is capable of delivering 280 volts at 100 ma using a 12 volt supply. It is somewhat unconventional in that it uses a pow- dered iron core (more properly called a ferrite core) which exhibits high saturation character- istics. Although the price is not known at this writing, speculation has it at about five dollars. For more information, write Triad Transformer Corporation, 4055 Redwood Avenue, Venice, California.

The author wishes to thank Mr. Richard B. Hurley (on leave from Convair Pomona) for the invaluable assistance provided in pre- paring this article. 73, Don, W6TNS

Companies manufacturing suitable toroid cores and litera- ture available:

Arnold Engineering Company, Marengo, Illinois. Manufac- tures "Deltamax", 4-79 Mo-Permalloy", "Supermalloy" and others. Bulletin TC-101A, SDC-110, and GC-106C

General Ceramics Corporation, Keasbey, New Jersey. Manufactures "Ferramic" Q, 02, H, and others. Bulletins #F-557, 857.

G. L. Electronics, 2921 Admiral Wilson Blvd., Camden 5, N. J. Manufactures "Deltamax", "Orthonol", "Hymu 80" and others. Bulletins TB-102

Magnetics, Inc., Butler, Pa. Manufactures "Orthonol", "Hy Mu 80", "48 Alloy". Bulletins TCW-150 and PC-103A

Westinghouse Electric Corporation, Special Transformer Department, Greenville, Pa. Bulletin 44-750

by BYRON H. KRETZMAN, W2JTI
16 Ridge Drive, High Hills, Huntington Station, N. Y

RTTY

Mac, WØATM, President of the Midwest Amateur Radio Teletypers Society, Inc.

W8NIY, Elkins, West Virginia.

Operator:	Rolfe A. Utz
Transmitters:	TCS-12, two; GO-9
Receivers:	TCS-12; RBM, two
Machines:	Model 14 typing reperf. Model 11A keyboard 1-A Tape Head

Amateur Radioteletype Channels

National, FSK 3620, 7140, 27.200, 29,160, 52.600 kc.
National, AFSK 27.2, 147.96, 144.138 mc.

Area Nets:

California	147.85	Mc.	AFSK on AM
Chicago, Ill.	147.70	Mc.	AFSK on FM
Detroit, Mich.	147.30	Mc.	AFSK on FM
Washington, D.C.	147.96	Mc.	AFSK on AM
	147.495	Mc.	AFSK on AM
New York City	147.96	Mc.	AFSK on AM
Livingston, N.J.	146.30	Mc.	AFSK on AM
Buffalo/Niagara	147.50	Mc.	AFK on AM
Boston, Mass.	147.96	Mc.	AFSK on AM
Seattle, Wash.	147.00	Mc.	AFSK on AM
Spokane, Wash.	147.15	Mc.	AFSK on AM
Minneapolis, Minn.	144.90	Mc.	AFSK on AM

KWS-1 owners have written me many letters asking if I knew of an "easy" way to frequency-shift this transmitter. (What they really mean is a way that won't affect the resale value!) Well, many owners are getting fsk by putting in two-tone audio, but you *do* have to be careful about what you are doing otherwise the gentlemen in Washington get unhappy, and when they get unhappy, *you* will get unhappy, too, sooner or later.

Frank White, W3PYW, found a better, and easier, way to do it, and he described it in the October 1957 issue of *RTTY*, the monthly bulletin of the RTTY Society of Southern California, Inc. ($2.50 per year via W6AEE, 372 West Warren Way, Arcadia, California.) So with the kind permission of Merrill Swan, we would like to tell you just how Frank did it.

A diode shifter using a 6AL5 tube is mounted in a small *Mini-Box*. A potentiometer, the shift-adjust control, is mounted on top so that its knob or dial is accessible when the box is bolted in place inside the KWS-1. The metal box is bolted against the side of the r-f shield cover of the tuning unit by loosening one of the existing screws and slipping the lip of the box under it.

Fig. 1 shows the schematic diagram of the diode shifter, and here is how you hook it up. First of all, set up a local d-c loop with the keyboard, the selector magnet(s), and a polar relay all in series. The polar relay contacts will

Dick, W3CRO, gives the expert's touch to one of the W9TCJ machines.

ıen be available to kev a *stabilized* d-c source be applied to the diode shifter in the KWS-1. '3PYW suggests using a VR tube to get a abilized 150-volts. The plates of the 6AL5 are ɔnnected through a 20-uufd mica capacitor ıd a small wire to the grid pin of the oscillator V-001). Pull the oscillator tube, wrap the small ire around the grid pin (1) and plug it back ı the socket

Adding the extra stray capacity to the oscil-tor will move its frequency out of the range the movable index, but don't let that bother ɔu. Just loosen the set-screws on the shaft of e VFO (where it connects to the dial drive) ıd correct for the change so that the movable dex is in the middle of the window.

To set the shift, zero beat the *mark* signal on ɔur receiver. The polar relay contacts used ıould be *open*, so that no voltage is applied to e shifter. Now, with a continuous *space* signal, ɔlar relay contacts closed (voltage applied), mply advance the pot until the frequency ovēs down 850-cycles. Once set in this man-er, the shift will be correct for 80, 40, & 20 M.

Frank says, "You will note that the entire odification is one that can be removed easily and when you decide to peddle your KWS-1 -but who is selling them? Wish I had one, too."

Good Grief

In the January 1958 RTTY column, *Fig. 1*, ıge 73 (!), the capacitor values associated ith the RANGE switch, S-3, were lost some-here:

S-3	RANGE	approx. value
1	0-100 cps	0.15 ufd
2	0-1,000 cps	0.015 ufd
3	0-5,000 cps	0.003 ufd
4	0-10,000 cps	0.0015 ufd
5	0-50,000 cps	300 uufd

Equipment

In the January 1958 issue of *CQ* we repeated Wayne's initial warning about a so-called "national" amateur radioteletype society. Recently we were informed by a mid-western group that this one-man society was attempted to unload (for a price) a batch of "miniature teletype-writers," obviously the Model 21A (page 28, *RTTY Handbook*), and neglecting to mention that these are narrow-strip printers *without distributors!* Fine for anyone going into the telegram business, but kinda rough on the newcomer.

[*Continued on page 113*]

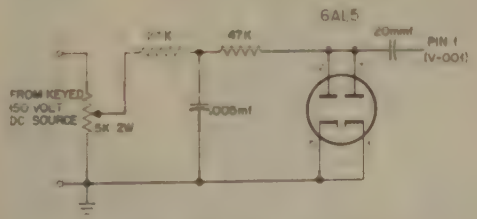


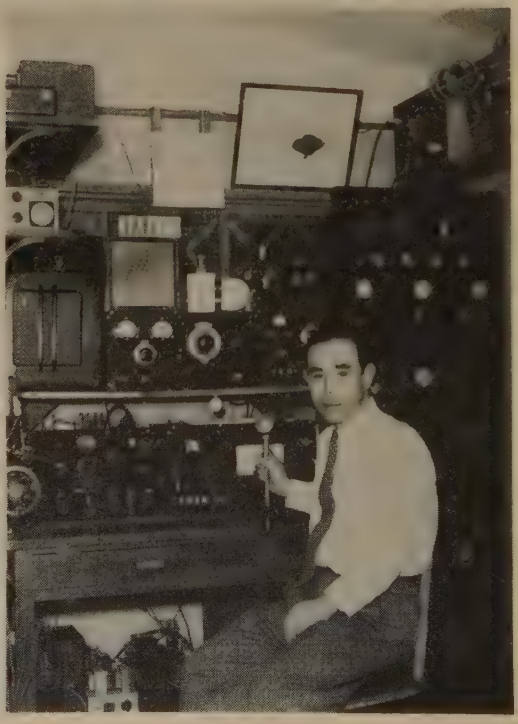
Fig. 1—Diode Shifter Schematic Diagram

VHF

50mc. 144mc. 220mc. 420mc. and above

by SAM HARRIS, W1FZ.
P.O. Box 2505, Medfield, Mass.

In case you think there ain't no activity on in Japan. Behold JA1ATF in person at the controls.



The news all seems to come from the six meter operators nowadays. I don't know if this means that all the activity is on six, or if the six meter boys just like to talk about it more. Suffice it to say: "the letters speak for themselves"! This should not be construed to mean that there is no work being done on the VHF bands above six meters. A quick glance at the states worked column will show that someone is burning the midnight oil. One thing is certain however, we just can't get enough news from the two meter and up boys, to be able to give you a good picture of what is happening on the real VHF bands. In order to put a little fuel on the fire, we are going to borrow from our British VHFers', the Century Club Certificate.

Two Meter Century Club

Any amateur station who submits proof of two way contacts with one hundred different two meter stations since January first (inclusive), 1958, will be awarded the "C.Q. TWO METER CENTURY CLUB" certificate.

Two Twenty Century Club

Any amateur station who submits proof of two way contacts with one hundred different 220 mc stations since January first (inclusive), 1958, will be awarded the "C.Q. TWO TWENTY CENTURY CLUB" certificate.

Four Twenty and Up Century Club

Any amateur station who submits proof of

'o way contacts with one hundred different ations on amateur assigned frequencies above 0 mc will be awarded the "C.Q. FOUR WENTY CENTURY CLUB" certificate.

Six Meter Century Club

Any amateur station who submits proof of o way contacts with one hundred different ations on six meters, will be awarded the Q. SIX METER CENTURY CLUB" certicate.

Microwave Associates V.H.F. Achievement Plaque

As an additional incentive, the first station n each band to qualify for the century club rtificate will receive "The Microwave Asso- ates V.H.F. Achievement Plaque". Hand- mely engraved with the number one Century lub Certificate information.

Microwave Associates V.H.F. Achievement Cup

To the first club which makes a grand sweep the century club certificates for all bands ill be awarded the "Microwave Associates .H.F. Achievement Trophy". Certificates sub- itted for this award must belong to certified ub members who were members in good anding at the time that the certificate was hieved.

Listings

Due to the paucity of stations available for tting your 220 and 420 century club cer- ficates we will list claimed scores for these vents. It will not be necessary to send proof contact for listing in the century club col- mn. A list of the stations worked, states orked and longest dx will be sufficient. hanges or additions to your listing must be eceived by the fifteenth of the month. Come n fellows. Let's see who wins that M.A. .H.F. plaque and century certificate number ne.

C.W. on Six Meters???

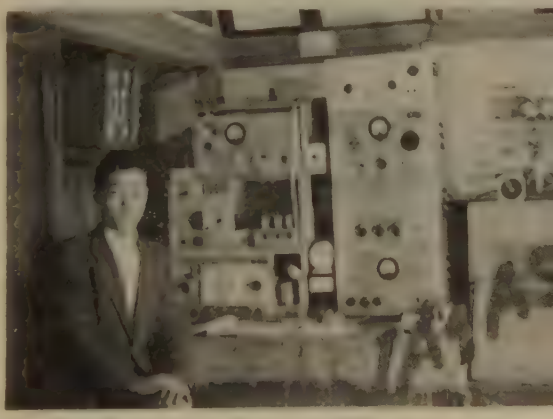
I don't like to mention it but . . . . . t seems that there is a move afoot to set aside he bottom one hundred kc of six meters for he exclusive use of c.w. I wouldn't want to ecome involved in the riot that would un- oubtedly ensue if this proposal were brought p for discussion at an otherwise peaceful athering of the clan. There are certain facts o be considered, however. It is, for instance, rue that communication by means of cw is ossible when all other methods fail. (I didn't ay it was worth the effort.) It is also true that ou can't work weak cw through even moder- tely strong phone signals. It is not true how- ver, that the elimination of phone on the low nd of six will eliminate interference. It will et rid of one source of interference and this ill give those skilled in the art, a much better hance to work that weak one. Whether the ccasional dx hound should be so favored is a ioot point. Some people would have you be- eve that the whole future of the six meter band hinges on whether old Joe works South Africa or not. I do not think that this is strictly true, although I am willing to admit that I wish I could work S.A. myself. (Yes, even on cw.) I have always held that a gentleman's agree- ment was the best way to legislate our bands. Rules instituted by a minority of "do gooders" are always the result of ignoring the rights of a dedicated minority. (As witness the ridicu- lous division of the lower frequency bands.) Let us, as the ZL's would say, be sporting about it. Give it some thought before you oper- ate phone on the bottom 20 kc of six. If you decide that it is really necessary . . . go ahead. If you can't honestly think of any good reason for it; QSY please.

Hamfests and Such

There are only a few get-to-gethers for V.H.F.er's during the year. The next one is just around the corner. Yes, it's the Dayton Hamvention. Last years doings were just tops and this years bids fair to be the best yet. If you are planning on being there too, get in touch with old Ev Taylor, W8NAF, (1125 Highridge Avenue, Dayton 10, Ohio) and let him in on the good news.

VE7AQQ

Another one of the "getting to be very well known" hams *not* in our own country is VE7AQQ, Ike, away up thar in British Co- lumbia. Ike is now well known to the six meter



JA1ASO (Akira) with his 50 mc station.

gang all over the country, due to the recent openings. It is really a great pleasure to hear Ike talking to hams anywhere in the states and sit and listen to his end of the conversa- tion from W1 land. With luck, we also hear the other end of the QSO on backscatter.

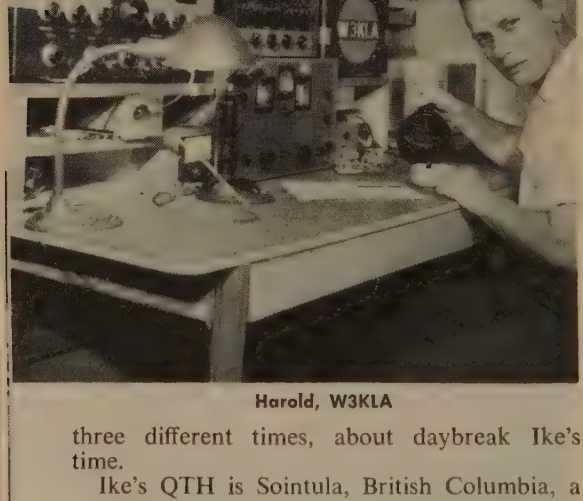
Here in W1 land we first heard Ike on November 2nd, 1957. Since that time we've had approximately fifteen contacts with him, and have managed to gleen the following in- formation.

First and most important, Ike's XYL, Frances, seems to love ham radio, and accord- ing to what we hear it would be impossible

for Ike to operate without her. Log keeping, remembering handles, QSL's and other important data is Frances' department. She is of Scotch descent, Ike of Finnish descent. If you doubt Ike's accent, just listen to him and Toiva, W1GKE, sometime. How they do rattle on in Finnish, and they say women talk a lot. They even outdo Helen on the air.

At last count Ike had worked all Japanese districts except JA9 and JAØ, and his contacts in Japan numbered sixty-nine stations. On the seventh of January, the east coast stations were hearing Ike calling and working JA's off the back of his beam. Any information and pictures concerning the Japanese stations in this issue, are by courtesy of Ike.

On the sixteenth of November, Ike was apparently the first to hear VK's and ZL's on six meters. About the nineteenth of November VS6CB was heard (by Ike) calling him. On November 21st he heard SM7ZN, and on the twenty-ninth of December he heard EI2W at



Harold, W3KLA

three different times, about daybreak Ike's time.

Ike's QTH is Sointula, British Columbia, a town founded about sixty years ago on the co-operative plan. Still co-operating and going strong. The name means United, Wisdom and Harmony, and from the sound of those now familiar voices, Frances and Ike are full of them.

Ike has the following to say of himself, or rather his rig: "I have included a snap of my own beams, the six element, six meter beam on top with the three element ten meter beam about ten feet below. My rotator is a cream separator, driven by a ¼ horsepower electric motor connected to the spindle shaft. A Ford starter gear is welded to the crank shaft, and a Ford rim gear welded to the mast. It makes one revolution a minute."

"There has been no JA's since November 22nd but some KH6's came through on December 6th. Of these KH6IJ was strongest."

Letters to Ike, VE7AQQ

Yokahama, Japan from Nakay JA1AK

"Thank you very much for our overseas contact six meters, on the 20th of November. That was my fi VE station, and was very excited."

"I heard VE7AFB on six meters yesterday, (Decemb 3rd) but could not catch him. I will get him in the future

"My station here is an 832A final, input is about watts. My first stage is 6AC7 clapp VFO controlled jc My location is about fifty meters up on the hill and c see Yohohama Port. I live in a four story apartment bui ing and the antenna is on the roof. My room is on t first floor, so I need at least 20 meters long feeder."

"Receiver here is crystal controlled, cascode, r.f. amp fier converter (home made) to the old type HRO receiver

"I am working as a draftsman under the Japanese sh radio, transmitter, marine radar company. My job design of radar scanner."

Kataharasho, Japan from Yasu JA2-603

"On November 16th, 1957, at 2359 GMT working wi JA6BI on 50.010 kc, when your signals were R5, S QRM-nil. QRN-slight QSB, B2 very good. My receiver a Hammarland BC779 (Super Pro) with homebrew crys controlled converter. The converter uses a 6BQ7A (ca code RF), 6AK5 (RF), 6AK5 (mix), and 12AT7 (osc.) The IF of the converter is 5 mc for 50 mc and my hom brew five element yagi beam is 12 m high, fed with 300 oh TV feeder and tuned to 50.5 mc with T match."

"I am 21 years old and hobbies are stamps, photograph heavenly body observation and music."

Funabashi City, Japan Keitars Sekine (Ray

No call included in this letter. Sorry.

"I was very glad to meet you on the air, for you are th first Canada station I've worked."

"I am 21 years old and a student of Waseda Universit (one of the greatest private universities of Japan), belon to the Radio and Electronics Engineering Section."

"I have started my 'ham' life only three months ag having taken the examination five months ago, 1st tim and passed it. Then I spent my summer vacation buildin up my shack."

"I have worked the following overseas stations: DU1G VK4NG, W7ERA, W7DYD and you. My record of th grand-wave dx on six meters reached about 250 km (15 miles) which was done with JA2MK."

JA1BLZ Sai to Masa Yuk

"Thank you very much for the nice QSO. I am ver glad to meet you, for that is the first QSO with Canadia station on six meters."

"I am a student of School of Science and Engineerin Waseda University, and JA1BLV, JA1ASO and JA1BN are my classmates. Now, recently we are listening for D almost every morning and a few of us have QSO's wit DU, VK, LU, CE, CX, PY, W6, W7, W9, WØ, KL KH6, KX6 and VE7. This station has worked DU, VK, W and VE7. I began operation on six meters on 11th October, 1957."

Tokyo, Japan Akira JA1AS

"Very pleased to make this contact with you, my fir VE7 on six meters."

"Now I'm a student of the school of science and eng neering of the Waseda University. My friends, JA1BL JA1BLZ, and JA1BNR with whom you've contacted, a my classmates."

Anchorage, Alaska — Jack Reich (KL7AUV Activities Manager of the Anchorage Amateu Radio Club sends the following informatio

"Listed below is the outstanding data concerning 50 m operation in the Alaskan area since November 5th, 1957

"Another opening occurred November 7th from 2345 to 0035Z, during which contacts were made with JA5B and JA6PJ."

"On November 11th, at 2015Z, W7PKL was heard, b not worked, and KH6UK was heard and worked KL7CDG. Jim (KL7CDG) also worked another—KH6PP

"On November 13, another opening to Japan occurre and contacts were made by KL7AH, KL7AUV, KL7CD KL7CDS, and KL7CHV. This occured between 232 and 0000Z."

"On November 15, KL7AUV worked KH6UK using c with very poor conditions prevailing, at 2103Z. At 2240

JA8BU, JA8AO and JA1AXE were heard but not worked."

"Of course the big splash occurred the 16th and 17th of November. For evaluation here are the results obtained by known Alaskan stations during these two days:

KL7AUV	Saturday:	1950Z to 2325Z – 50 contacts Areas: 1, 4, 5, 8, 9, Ø, – 14 States
	Sunday:	1815Z to 2155Z – 45 contacts Areas: 2, 3, 4, 5, 6, 7, 8, 9, Ø, – 6 new states
KL7CDG	Saturday:	1931Z to 2315Z – 47 contacts Areas: 1, 2, 3, 4, 5, 6, 7, 8, 9, Ø, – 20 States
	Sunday:	1826Z to 2203Z – 57 contacts Areas: 1, 2, 3, 4, 5, 6, 8, 9, Ø, – 7 new states Two VE's – VE3AET and VE3AIU. 2357Z to 0005Z – Three JA contacts.
KL7AH	Saturday:	2154Z to 2257Z – 30 contacts – 10 States Areas: 2, 5, 8, 9, Ø.
	Sunday:	1906Z to 1158Z – 47 contacts – 6 new states Areas: 2, 3, 4, 6, 7, 8, 9, Ø. 2359 to 0018Z – JA4AZ, JA6FR, JA6JY.
KL7CDS	Saturday:	2150Z to 2205Z – 2 contacts – 2 States Areas: 1, Ø. Kenny's transmitter-sour
KL7CDS	Sunday:	1930Z to 0035Z – 22 contacts Areas: 1, 2, 5, 7, 9, Ø. 13 new States and 5 JA contacts during latter part of period.
KL7HV		
KL7AYZ	Sunday:	Time unknown: 5 contacts. Areas: 8, Ø, and JA. Gibb is at Kwethluk, Alaska, near Bethel, and about 300 miles southeast of Anchorage.
KL7CDT		No data available, although we have heard of contacts made with the States. He is located in Whittier, Alaska, about 80 miles southeast of Anchorage.
KL7MS and KL7AZI		No data available, although stations were heard working June and Woody. They are located at Sisters Island, just southwest of Juneau.

"This information was as carefully verified as possible, and should present a fair picture of the operation from the Alaskan end. Speaking for all of us, we intend to make as much of these openings as possible. The QRM we hear is terrific, so we may not be able to work everyone, but we are trying." *Thanks for a very thorough report, Jack. The gang really appreciates it.*

Dallas, Texas – From that large spot in North Americas we receive word from Ken Durham (K5MBV) concerning goings on:

"We have had several good openings here recently. EI2W was heard by some of the gang during the A.M. of November 16th. On November 17th, KL7's were coming through and were worked by a few of our locals (I was at work as usual)."

"On December 16th and 17th there were openings to several states about 1700 our time. I missed these also. We came home early on the 18th and turned on the receiver at 1800; heard W8RLT and hooked him, then W8SWC, W9JCI, K9JVZ, W9HMB and K9AKI. Heard a number of others including VE3, W8, W7, 9 and WØ."

"Last stations heard were in Colorado and Nebraska, but they did not seem to hear our gang, although they were working stations in Houston and San Antonio." No more stations heard at my QTH after 2108. They rolled in solid for three hours with most signals at least 20 db over."

"The rig here is BC625 into a vertical and a P and K converter ahead of an old GE broadcast receiver (works O.K. with openings like this)."

"On December 19th, the band opened again and I worked WØHNV, W8HJR, K8ACC, heard VE3AIU in QSO with a local, worked W8WPD, K9BEO, K8AYQ, K9IEH, K9DVI and WØYWP. Also had a forty-six minute phone patch traffic with K9EAO in Skokie, Illinois. The band opened at 1800 sharp and closed approximately 2108."

"Again on the 20th I worked a number of W7's and W8's. The band was open at 1800 and closed about 2215."

"On about the 22nd, K5DXJ here in town, worked an SM7 in Sweden and I heard quite a bit of teletype about 51 mc."

"As I'm not yet in the call book the boys may not have my address even though I gave it to them during our contacts. It is Ken Durham, K5MBV–3828 B, Southern Oaks, Dallas, Texas." *Thanks for the very informative letters Ken, we don't hear much, via six meters, from Texas, so we appreciate your efforts.*

Markham, Illinois – From out Chicago way we hear from R. Oberg (W9ZKQ):

"Our net here in Chicago is doing fine. We have four net controls, one for each Tuesday in the month. K9HWY, W9NYO, W9RVG and W9ZKQ handle traffic and club business respectively, on Tuesdays 2230 CST, 50.400 mc. We sure would like to link up with other nets on 50.400 to handle traffic and messages East and West from Chicago. We monitor 50.4 mc, so it would seem simple enough to call other net stations at certain hours to take traffic."

"The possibilities of a six meter link are interesting and maybe could be done some day soon. Any stations interested should contact W9ZKQ for details." *Very interesting project O.M., it's been done both on six and two meters for coverage over an extremely large areas, and should be more than interesting with its starting point at Chicago.*

Contest winner in Indiana, Chuck Gibbs, K9COK. It takes lots of that stuff to win contests. Guess ole Harold had enough to win for Maryland.

Hinsdale, Illinois – Another inhabitant of Illinois comes through in the person of Russ Brown (K9DYE).

"I heard VE7AFB, AOD, AQQ, CN, and W7's ZOW, YJW, RPD, QGG, FAS, BYK, YJE, on January 4th between 1100 and 1300 CST on six meters."

"The receiver here is an FCV-1 International Crystal converter fed into an NC-88, suing an end fed wire."

"I have a technician license and am eighteen years old." *Thanks for the DX news from your territory Russ, always very glad to receive it.*

Youngstown, Ohio – Youngstown, Ohio comes forth via Bill Finger (W8SZN):

"I would like to report that I worked Steve, HB9QQ in Duebendorf, Switzerland on 50 mc crossband to 28.220 mc on the 30th of November, 1957. I believe it was the first W8 contact to Switzerland on these bands (six to ten meters). I also heard a lot of stations calling him, W1,

W2, W3, W4 and W8, but he said that due to QRM he was unable to copy anyone else." *Congratulations Bill, always nice to talk to Switzerland.*

Dallas, Texas – Another epistle from Dallas this time from old Leroy May (W5AJG) himself.

"Been working on six meters lately. Last few weeks have brought forth some DX from Europe. Nothing like the east coast gets daily though. What do we have down here? Hear the same stations over and over on six but hardly any new ones. Have worked such as LA9THA, EI2W, SM6BTT, SM6ANR, LA9T and LA8RB." *Who else do you think we work?*

"Hear lots of backscatter when band is in DX condition. Hear W9, WØ, W4, W7, W6, all scatter type mode. BBC TV on Channel two very strong on audio and video. Lots of garbage along in the band. Not video, but can't identify it." *Wonderful to hear, eh, Leroy?*

"I've worked several KL7's around noon CST." *Nice going, Leroy. Guess you just do have everything in Texas, even DX.*

"Don't believe that the Meteor scatter for the December 'Showers' was as good to me this year as last year on two meters. The stuff was awful short in duration."

"Managed to pick up state number twenty-one, Michigan, during the showers. Pitifully few states, I know, but they are hard to get down here with no Tropo and little aurora. Really have to work to get 'em here." *Congratulations once more O.M. Think we all know how hard it is to get 'em in Texas, and how hard you work for 'em too.*

Augusta, Georgia – Down South way, Will Strauss, (K4MWN) sez:

"It may be helpful to K4KYH (*and others tOO*) to know that I have successfully put the DX-35 on six meters. I followed the instructions in W9KLJ's article on page 48 of January '57 'CQ'. I did not follow the instructions to the letter, but I did make the same basic modification described in the text (I did it the hard way)."

"I am the only ham on six meters here in Augusta, and I got on the air less than a month ago. My first contact was with WØVZJ in Linwood, Nebraska (*Honestly Will, it isn't always like that.*) and on the twentieth and twenty-fourth, Santa brought me four new states. They were all W9's and WØ's, because my beam is pointed in that direction. I almost worked a W8 but another station came on top of him when he came back to me."

"I have yet to work a Georgia or South Carolina station on six (even next door)! I have observed that the skip favors me about twice a week and around 1930 EST." *Just remember one thing about six meters Will! You just can't ever depend that it will act normal, abnormal, subnormal, or whatever.*

Albany, Georgia – Just to get the Georgia boys acquainted, thought we'd put this one in from Ben (K4BLA) after the preceding letter.

"Not much to report this month, but here goes. First of all I got K4KIV on six meters here in Albany, and I'm wondering if anyone would be interested in the design that I used. It is very cheap to build. I used an old receiver power transformer and the international crystal oscillator with a 5763 final, modulated by a 6V6, no meters. Another item, K4CML, the Marine Corps supply center radio station is sporting a new Globe Scout 680A transmitter and will soon be heard on six meters."

"Heard no signals from the first through the fourth of December, worked W4ATP/4 on the fifth. No signals heard sixth through the sixteenth. On the seventeenth I heard W1SUZ at 1915, also heard W3UBH at 1917, but no other signals coming through. On the 18th K4KIV and myself were having a QSO and we had a breaker. It was K8AML. After that we worked a number of W8's, 9's, and Ø's, and heard many more. Picked up a new state that night, KØLAD, for Kansas. On the 19th and 20th, W9's and WØ's came in. Twenty-first, no dice. Twenty-second heard LA7Y and SM7ZN working North Carolina, Tennessee and South Carolina but no Georgia. Twenty-fourth, open to 8's and 9's. On the twenty-eighth heard W1's and 2's. Thirtieth, open to W8's. Thirty-first worked W4CCA, first time since September."

"1958 started off with a bang on six meters. Heard W4AZD and W4UUF in QSO. 4's, 8's and 9's were heard, also WØ's. One other piece of news, received my conditional class on the 16th of December." *Congrats, Ben. Once more, Thanks and CUL.*

Marissa, Illinois – Bob (K9EID) has a few words to say, and says them too:

"The local ground wave contacts are very few in the past two months as Channel 2 in St. Louis, (KTVI) chased everybody off six meters. But that doesn't bother us down here, sixty miles, S.E. of St. Louis, so we are wide open for DX as there isn't much competition."

"All of us around here have worked KL7's, VE7, LA's, SM7, SM6 and EI2W. We have never heard anything West of us though, except in the states. We did hear one JA but no VK's or KH6's. I've heard reports of many fellows working them, but we haven't heard them here."

"Now that we have forty-three states on six, the last eight (five) are getting hard, but we'll still be in there pushing harder now that the 829B is on the air." *F.B., Bob, on your work in Europe. We've heard rumors too, about working outside the U.S. to the west, but have heard nothing as yet.*

Porterville, California—Alan Margot (W6FZA) writes from that sunny (?) state.

"I worked EI2W on Tuesday, January 7, 1958 on six meters for WAC. I think it was the biggest thrill in twenty-six years of ham radio. I had been gunning for him (who hasn't?) since November, and was beginning to wonder if it wasn't all over for another eleven (?) years."

"I was leaving for the office about an hour late and was instructing the XYL (K6ZEH) where and how to listen for Harry. An S9 signal came on the channel calling 'CQ W7'. Knowing Harry could never beat that one down, I got up to leave. The signal signed EI2W, (*came back in a hurry didn't you Alan*) I called and he came back, giving me S9 plus 30 db. Toward the end of the QSO a strong W1 came on, announcing to whoever he was working that if anybody wanted to work EI2W, he was right on this frequency! Harry wasn't heard from again." *A helpful soul, eh!*

"I think the extra kick comes from the fact that the feat may not be duplicated for another eleven years. Anyhow, in my delirium I cabled him (WHAT!), and his card and a nice letter came yesterday."

"I still need confirmation on my one JA and one LU contacts. Worked the JA on November 10th and the LU last spring. *Come on fellas, you can see it's important to QSL.* My ZS3G card came in last week."

"The XYL is rapidly moving toward WAS, taking advantage of the phenomenal F2 openings. She worked nine new states in one four hour session last week, and has gotten five tough ones near here on backscatter during these recent Alaskan openings. She's been on only eight months, but her states total makes mine look sick. I sure get tired of sweeping house and doing dishes, though." *Sam gets tired of pushing through gift wrappings, pine needles, etc., from Christmas. – Helen.*

"Porterville is in that magical San Joaquin valley, south of Fresno, where the DX comes in. W6FZA rig runs 180 watts to a 4X150 A, receiver is homebrew with 6J4's. Antenna is a five element yagi, eighty feet high."

"Two meters is moving along. Have nightly contact with W6AJF (about 300 miles) with consistent signals." *Very interesting letter Alan, but boy oh boy, that cable gets me.*

Birmingham, Michigan – Hartland Smith (W8VVD) has an interesting TV story for us.

"I thought you might be interested in my experiments in receiving pictures from the BBC television signal on 45 mc."

"My monitor for the 40-50 mc range is an old prewar Meissner FM tuner. Since I noted that by late November, the BBC video was coming in much louder than an industrial paging service on 43 mc, which has a transmitter about fifteen miles away, I decided to see what kind of picture I could get on my old ten inch Westinghouse TV receiver."

"After scrounging through the junk box, I found an old two meter converter using a 12AT7. By changing the coils, I revamped it to convert the 45 mc video to channel five which is vacant in these parts. This didn't give me enough gain, so I added a 6AG5 preamp. Then, whenever the 45 mc video signal was coming through, I could sync the picture vertically. Horizontal synchronization was still

a problem. By adding 4000 mmf across the horizontal ringing coil, and by readjusting the slug of this inductor, the horizontal oscillator frequency was lowered to around 9000 cps and whenever the BBC signal was good, I could obtain horizontal sync."

I was able to see objects moving on the screen, but they were unidentifiable, due to the fact that an English picture appears as a negative on US receivers. This problem was licked by reversing the leads to the video detector diode. Now black appears as black, and white is white."

"On December 8th, around 1100, I was able to get a very good picture of a woman's face. Her hairdo and features were quite distinct. Also, a closeup of a man came through quite well. No results were had again until yesterday, when, during the running of a grade B gangster movie, a number of closeup shots of human faces were recognizable."

"Although the BBC video signal is often very strong, the identification of picture details is usually difficult. First of all, due to multi-path transmission, the average picture contains from six to eight ghosts. Second, the selectivity resulting from the use of a preamp and converter tends to smear out all but the larger details. Third, the interference from a number of U.S. stations operating near the BBC frequency result in quite a bit of TVI patterns on the screen."

"Nevertheless, now and again objects in the picture, especially large ones, are recognizable. Band conditions haven't been nearly as good since I got my receiving setup perking. I only wish I'd had it working in late November when signals were strong from before 0800 until 1330. Now the peak is around 1030 with reception only good for around a half hour, and then only on an exceptional day."

"The antenna, by the way, is a two element beam in the attic. A twinlead folded dipole and a wire reflector strung between the rafters."

"My attempts at photographing the tube screen have been rather hopeless, so far, but hope to get some decent shots." *Very, very, very interesting. Don't know of anyone else who is doing the same thing and it surely shows possibilities. Good luck and good DX with the TV.*

Dallas, Texas – W5AJG, Leroy, sends another quickie to let us know that he picked up state number twenty-two, Wisconsin on January 1, 1958.

Chippewa Falls, Wisconsin – Great good news from Willy Moulton (W9DSP).

"A quick note to tell you about November 16th, 1957, as regards some dx worked from the sticks here."

"Worked G4LX in the morning around 1100 CST which is unusual here this late. Followed it with ZE1JN and ZE2JV, at 1205 to 1214 CST. Later on worked four Alaskan stations on that date, which were KL7CDS, KL7AUV, KL7CDG and KL7AH. This followed by JA8CX, JA7Y, JA7GB, JA2AQ and JA2GR. Made four continents in one day! What will six do next?" *Don't ask us, just wish we had days like that.*

"Also heard W1HOY in there on backscatter."

"November 17th was good but no Africans or JA's, but KL7's still rolling through and having themselves a field day working everything from W1's to W5's, from east coast to Colorado." *Mother told me there would be days like that, but I've still to hear them.*

Santa Rosa, California – Good ole' Paul (W6BAZ) emits with:

"Yesterday (January 9) I worked VE1HT at 5:33 P.M., Atlantic Standard Time, and he said it was completely dark there. That is quite late for F2. Understand that someone in W2 land heard an XE this morning." *Don't know, haven't heard.*

"So many reports of VE8, that I think something will be popping up there soon." *It did Paul, W2IDZ/VE8 worked W5SFW in Amarillo, Texas, on January 16th.*

"If someone would promise me an opening like the last few days, about this time of year, I would make a deal with W7ACD to go up to his place in Idaho, and be the most popular station the six meter band. *And we're all for it Paul.*"

"Just counting up and have had over four hundred contacts in the last thirty days, most of them being F2." *And they say I talk a lot. – Helen.*

by DON CHESSER, W4KVX
R.F.D. 1, Burlington, Ky.

DX DX DX DX DX DX DX DX

WAZ

The huge hoard of Zone #23 cards flowing from prolific JT1AA proved most welcome to the majority of these well-known DXers who have just achieved the coveted WAZ award. Congrats, fellows!

#366	VE8AW	Lyle Geary	(10th VE)
#367	W2HMJ	Aug Nickel	(9th W2)
#368	W5JUF	John C. Papp	(6th W5)
#369	K5ABW	Jim Price	(7th W5)
#370	JA1AG	Akira Kurokawa	(3rd JA)
#371	KL7PJ	Charles H. Sappah	(2nd KL7)
#372	WØAIW	Lee Bergren	(13th WØ)
#373	W9YFV	E. G. Schmeichel	(11th W9)
#374	W7AC	Richard S. Crane	(21st W7)
#375	W2LPE	Frank Policastro	(10th W2)
#376	W3KDP	Reynolds W. Collins	(15th W3)
#377	W4LYV	Charles D. Harris	(8th W4)
#378	W4GXB	Charles G. "Tex" Price	(9th W4)
#379	W9LNM	Art Saboe	(12th W9)
#380	5UX	R. W. Carr, Jr.	(8th W5)
#381	K2DCA	Paul Tissot	(11th W2)
#382	K2GFQ	Paul Hallingby, Jr.	(12th W2)
#383	W8JBI	Ted Drake	(17th W8)
#384	W8MPW	Carl A. Drake	(18th W8)
#385	W2ZGB	G. A. Sellers, Jr.	(13th W2)
#386	W4ML	Tom S. Stuart	(10th W4)
#387	W5CKY	Robert E. Shank	(9th W5)
#388	W6GMF	Joe Lebenzon	(123rd W6)
#389	WØNLY	Edwin J. Moles, Jr.	(14th WØ)
#390	W6DBP	Bob McLellan	(124th W6)
#391	K6ENX	Otto C. Miller	(125th W6)
#392	W3ZAO	Lawrence P. Flavin	(16th W3)
#393	W2SAW	Addison N. Ringler	(14th W2)
#394	W9VIN	Ray L. Burnett	(13th W9)
#395	W5TPC	Paul G. Cadwell	(10th W5)
#396	W5FFW	Harold E. Davis	(11th W5)
#397	W4LZF	Francis H. Melcher	(11th W4)
#398	W1BIH	J. H. Thompson	(5th W1)
#399	VE6VK	Russ Wilson	(11th VE)
#400	W6ZEN	Floyd McPherson	(126th W6)
#401	JA1AA	Hisao Shono	(4th JA)
#402	DL1BO	Theodor Flick	(8th DL)
#403	W9FJB	Harry C. DeMuth	(14th W9)
#404	JA1DM	Masayoshi Ebisawa	(5th JA)
#405	SM5KV	Olle Ekblom	(4th SM)
#406	W8UPN	J. N. Grieveson	(19th W8)
#407	W2PTI	Francis A. Waggoner	(15th W2)
#408	FA8RJ	H. Grossin	(1st FA)
#409	SM7MS	Rune Rasmusson	(5th SM)
#410	W6YY	John Knight	(127th W6)
#411	W5HDS	T. M. Hoffman	(12th W5)
#412	W6GPB	Joe Horvath	(128th W6)
#413	OK1KTI	Kockerov Radio Club	(9th OK)
#414	W4QCW	J. Robert Eshleman	(12th W4)
#415	HB9EU	Rudolf Faessler	(3rd HB)
#416	LA3DB	Thorleif Soloy	(2nd LA)
#417	W5EGK	Philip P. Lynch, Sr.	(13th W5)
#418	W2TQR	Robert L. Mast	(16th W2)
#419	W3RUT	Vincent J. Grechen	(17th W3)
#420	W8DHC	Onne L. Santti	(20th W8)
#421	W6UQQ	Edward Sassaman	(129th W6)
#422	W6ALQ	Max Anders	(130th W6)
#423	W8BF	J. Orrie Baumgardner	(3rd W8)
#424	W6OYD	Frank C. Eckert	(131st W6)
#425	W5RS	E. C. Townsend	(14th W5)
#426	KL7MF	Harold D. De Voe	(3rd KL7)
#427	W3EPV	Robert H. Stoner	(18th W3)
#428	G6YQ	George A. Massey	(27th G)
#429	W9UXO	Frank W. Veith	(15th W9)
#430	W3CGS	Harry W. Stark	(19th W3)
#431	W6QNA	Gene Hyatt	(132nd W6)
#432	W5BZT	Robert L. Mims	(15th W5)
#433	W5FXN	James M. Price	(16th W5)
#434	W8GLK	Paul E. Burkhead	(21st W8)
#435	W5ABY	Kenneth Montgomery	(17th W5)
#436	WØQDF	Bill DuBord	(15th WØ)
#437	WØBFB	John R. Hinegardner	(16th WØ)
#438	W3ECR	R. E. Hatfield	(20th W3)

Further congratulations are due the following who made WAZ the hard way—all phone!

#12	W8BF	J. Orrie Baumgardner	(3rd W8)

A 1946 phone QSO with C8YR paved the way for Orrie's grand slam.

Lack of space prevents further description of the achievements of these forceful gentlemen, but we must point out the feat of K5ABW, to our knowledge the first American K call to win WAZ, indicating a period of operation only during the past few years. Jim's 40 confirming gems were all dated within the past two years. Others in the above list, some hiding behind W calls, were novices not many years ago. Ted Moles, WØNLY, for example, a novice only five years ago, now has WAZ and 246 DXCC countries, nearly every one confirmed.

Ted's incredible performance is rare, indeed, but the increasing frequency of new calls and young talent on the WAZ lists is a refreshing sign—proof that young blood is creeping into the exalted DX ranks, and proof that youngsters are now competing successfully with old timers with decades of experience. The old timers, greying at the temples if not white or shiny on top, burning less and less wee small hours oil these nights, would be first to acknowledge and acclaim this welcome development.

CQ DX Department Changes

Since taking over the reins of this DX column a short but frantic three months ago I have given much thought to suggestions and plans to make this department more effective and efficient. Much time and consideration have been devoted to discussions of the subject with big and little DXers from coast to coast. Some of the results I've relayed to Wayne, W2NSD, chief editor of this rat race, for his official opinion. He has complied gladly, usually ending his remarks with: "But it's your DX department, Don. Do as you think best." Consequently, I have no one to blame but myself if the plans go awry, or if there is more than the usual criticism of the following department changes.

Two major topics kept popping up during these discussions: first, please devote more time and space to the youngsters and new hands to DX than in previous years; and, second, do something about the ambiguous "CQ count" of DX countries.

The first topic needs little amplification, for

w will deny the vital importance of new
)od in any organization or endeavor. Ama-
ır groups and DX clubs around the world
ve at least one common problem and sub-
:t for debate—how to attract fresh young
ent into their ranks. Many clubs deem this
opic A", of life-and-death importance to
ir future existence, and act accordingly to
ate interest in amateur radio in general and
Xing in particular among their local young-
rs. Acknowledgement and credit for their
orts is one way to attract their interest.

Even more important than the various clubs
the very existence and future of amateur
dio itself. We are warned, and CQ will pub-
ize the facts and dangers in future issues,
at we are in grave danger of losing much of
ir HF. DX bands in the forthcoming 1959
ternational radio convention. Foreign gov-
nments and commercial interests are again
eing our bands greedily, and they intend to
some wholesale carving if they can.

To hold our frequencies we must continue
prove our necessity in the public interest.
mateur radio has proven invaluable as the
ource and training ground of most of our
p electronic scientists who started in this
bby as youngsters. We must enlarge that
ol of talent many times over to keep pace
ith modern scientific requirements. Only by
doing will we prove our public necessity.
n the young rests our future.

The second topic, the "CQ count" of DX
untries, presented not so clean-cut a resolu-
on, although here again I was in complete
greement.

It is indicative that no one of the dozens of
Xers approached for an opinion approved of
e so-called "CQ count". They thought it
perfluous, confusing — even silly. A surpris-
g number asked why we bothered with Honor
oll lists at all. Critics insisted they meant little
ecause they were not backed by confirming
SLs — that anyone whose honor may be
ightly exceeded by ambition could enjoy an
nearned high position on these lists—that in
ct some do. An impressive number of DXers
ated they had submitted an Honor Roll score
nly because it was required for WAZ listing,
it that they submitted no further activity on
e lists because they felt the scoring had no
al basis of fact—no backbone.

Discarding the "CQ count" and requiring
nfirmations seemed a simple and sensible
lution until it was pointed out we would be
ft with a direct copy of QST's DXCC listings.
hy have exact duplicate lists in the two maga-
nes when one covers the subject so ade-
iately? Why indeed!

Further influence in this decision was this
uation: I've sat at DX meetings and con-
ntions for hours listening to heated and
metimes bitter arguments among DXers and
tween DXers and ARRL about what, pre-

cisely, constitutes a separate country, and about the inconsistencies and vagaries of DXCC. The most recent opportunity and case in point was the Northern and Southern California DX convention at Fresno January 18th and 19th. This delightful, high-powered, high tension annual get-together of many of the world's top DXers proved hand-tailored for the clarification of some of my problems.

One such resolution, without delving into personalities or controversial subjects, was that I should avoid, if possible, involving this department in the storms currently engulfing DXCC. If this department must suffer storms, at least they should be of its own making. With this decided, the rest was clear.

Effective immediately, at the suggestion and recommendation of representative DXers across the country, and with the approval of CQ's management, we are dropping all countries-worked lists from CQ's Honor Roll, and will substitute WPX. I regret this inconvenience to those of you who have painstakingly compiled your country lists and submitted them to this department recently, but our untenable position makes the move necessary.

WPX

Don't sell WPZ short! Upon investigation I believe you'll find it an even better indication of a DXer's ability and prowess than DXCC, for it divides most countries into geographical subdivision. It emphasizes land masses with the highest concentration of amateur stations, thus inviting active operating rather than passive listening. Its more than 700 possible prefixes as against less than 270 countries accentuates the positive. And it is more flexible, for it offers several basic certificates of award, plus stickers for single-band accomplishments.

Further, WPX avoids all confusion and arguments over constitution of a separate country. Prefixes are prefixes, without room for doubt or controversy. New prefixes will be honored as they are issued by the various world governments, without notice or judgement by CQ, this department, or any committee.

And, perhaps most important in this scientific age, WPX promotes and supports our youngsters, for about 40 novice prefixes are assigned, here and overseas.

Basic rules for WPX were published in the January, 1957, issue of CQ. Exactly how WPX will be handled by this department or how scores will be listed in these pages have not yet been decided. Further decisions, plus possibly some minor rule changes, will be announced in future issues. Suggestions are always welcome, and will be thankfully received.

One thing is certain, however: WPX will have backbone, for confirming cards will be required for all basic certificates and for all scoring above those figures, at the least.

We urge your participation in this new and different DX scoring system. Administration WPX, including correspondence and applic tion blanks, is now being transferred fr CQ's New York office to this departme Please send all WPX cards, applications, a correspondence, as well as WAZ and D matters, to the address at the head of th column. Good luck!

The Honor Roll (sob!)

Before we bid a sad farewell to the countri lists, special recognition should be paid tho two giants of DX, Don Wallace, W6AM, ar Charlie Mellen, W1FH, for their success heading the lists these many years. Don wour up with 280 countries on CW by workin PY7AN/Ø on December 13th, and 235 o phone. At the last report, not current, Charl had 276 on CW. Congrats, fellows! Now ho about a try at WPX?

Expeditions

PY7AN/Ø and PY7ACY/Ø successfully pu Fernando de Noronha on the DX map fo three days recently, Dec. 13th through 15th 1049 QSOs, mostly with Ws, resulted on 1- mc phone and CW, W1FH scoring on both It appears 40 or 45 countries were worked although results are still being tabulated a this writing. Equipment included an NC183D HQ100 and preselector, 813 CW rig runnin 120 watts, ART13 phone rig, and doublet an tennas. Operation was from the schoolhous in the village of St. Anna.

The idea for this expedition was conceive by Major Mafra, Governor of the Territory o Fernando de Noronha, who expects his ow ham ticket soon. By personal trips to Rio h succeeded in obtaining the prefix assignmen PYØ for the island, and arranged for the tri by Vic and Odacy. Two other hams, Sg Camilo, PY7LR, and Capt. Macedo, PY7S are now stationed on the island, as is an Ameri can ham, Phil Hendricks, WØYFE/YJU, a tached to the RCA missile program. Perma nent activity is anticipated by the Brazilians but not by Phil. He's been trying since las September to get authorization to operate, bu Brazil licenses only native-born Brazilians. "I seems hopeless for American hams ever t operate here unless rules are changed," con cludes Phil.

Fernando de Noronha has been accredite separate country status by ARRL and card may be submitted later this year for DXC credit. PY7AN and PY7ACY promise QSL 100%, and cards may be sent them at thei callbook addresses, via LABRE, or via Phil C Hendricks, RCA/PAA, Fernando de Noronh AAFB, c/o Patrick AFB, Fla.

The OVARA Cincinnati group which stirre up a commotion as VP5BH, Grand Cayma last March, is planning another trip this yea but at this writing we don't know where w are going. First choice is either Socorro (XE4

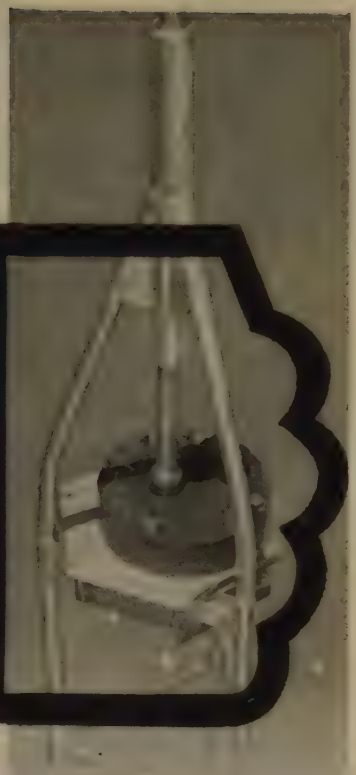
[*Continued on page 92*]

NEW

Complete Rotating Assembly!

00 IN. LBS. OF ROTATING POWER
,000 IN. LBS. OF BRAKING POWER

the iron fist . . .



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Patent Pending

Rotate! Hold! Indicate!

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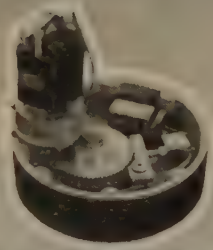
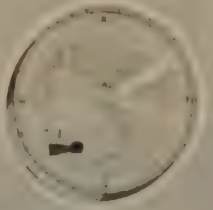
Complete with Brake, Rotator and Indicator

The Rotobrake designed for internal mounting in steel towers 18-18" inside clearance shipped complete with brackets for mounting in towers of this size. Kits available for mounting on side of pipe and pole towers. Brake unit encased in heavily ribbed, heavy wall, cast aluminum housing. Two bronze thrust and bearing surfaces are press fit into top and bottom of housing, designed to support more than 1000 lbs of dead weight. Rotobrake is a complete rotating assembly, with spring actuated, solenoid released braking unit, built-in powerful twin [illegible] rpm rotating motors, and Great Circle Map indicator and control box. Tests without failure up to 12,000 in. lbs. of torque. Also available dual rotator Rotobrake for rotation of extra large antenna assemblies. Twin rotators (four motors and two gear reduction units develop 1000 in lbs of rotating torque. $179.95



High carbon machined steel gear and rack, heavy shoulder bolts and lock nuts, oil sealed bronze bearings provide positive braking action. Twin 3600 rpm motors develop 500 in. lbs. rotation torque. Gear reduction unit factory sealed.



Multi-colored Great Circle wall map indicator, 16" in diameter. Moving wedge of light, 10° wide at perimeter indicates beam direction. Countries outlined and call areas labeled. Control box mounts under operating table.

hy-gain antenna products

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For further information, check number 40 on page 126.

or Clipperton (FO8), probably XE4, but th depends on the successful acquisition of a boa from California. Negotiations are now in prog ress, and results will be announced as soon a possible.

Alternate destination is Guadeloupe (FG7) although here again troubles and delays ar being experienced obtaining French licensin permission. Plans should be well develope by the time you read this. Contact W4KV on 14010 kc 0000GMT most evenings, or se the DX Bulletins, or drop us a card, for furthe details.

DX News

JT1AA is going on phone in February, whic news should create a ripple among the staic phone brethren and a still longer work-week a W4KVX! Ludvik's Czech friends have shippe him a NBFM exciter, advises YU1AG, an he may be on 21092 kc phone by the tim you read this. Language barriers may be con siderable, and may require HV1CN-like oper ating through Czechoslovakian interpreters Meanwhile, JT1AA is now active on 2104 and 21092 kc CW, usually the latter, at 100 to 1100GMT, with good signals. Ev, KP4KD among other happy souls, recently worke him on this new band. We understand Ludvi intends to try 28 mc phone and CW later thi year.

Effective January 1, 1958, Ghana's prefi changed from ZD4 to 9G1, although the suf fix letters of individual calls remain the same Jim, W10KG, contacted 9G1CF on Jan 12t on 21 mc SSB, believed to be the first 9G1/V SSB QSO.

Kuwait is well represented by Bill, MP4 KAC, these days, especially Fridays, advise Elmer, W3ROA. Friday is the Mohamme day of rest, similar to Christianity's Sunday and since it's Bill's day-off he hams all day He uses 40 watts to a 3-element beam. Elme worked him on 14170 kc phone, but look fo him also on 21 and 28 mc phone.

Frank, DL4EAC (W2NDS), informs u Turkey is back on the DX map temporaril and semi-underground. Ole, DL4GF/TA, say he has sort of unofficial official permission t operate 14 mc CW only, and is trying to pus authorization for full TA licenses.

Reg Tibbetts, FS7RT et al, opened up a VPØRT from Anguilla, Leeward Group, Ja 20th on 21 mc SSB, writes Mickey, W8YIN This island is part of the newly founded "Fe eration of the West Indies", which includ VP2, VP4, VP5, VP6, etc. Mickey asks, wonder what this country status is?" An exce lent question! The new call, VPØRT, is a bon fide license issued by the new governmer QSL via W6ITH.

73, Don, W4KV

OOPS...

Good Grief Department

A note from Leonard Geisler re his "Souping Up the Super Pro" article in the December CQ: the blue wire from the last i.f. can not only ties to the 120K resistor, but is also connected to pin 5 of the 6H6 in fig. 3. The unmarked cathode resistor of the top 6SL7 in fig. 2 is 1.5K. The terminal strip layout is correct as printed . . . if yours differs Leonard will be glad to help you out if you send a sketch of yours. His QTH appeared on the article. He suggests the use of Aerogrammes which save considerably on postage to Japan. One last hint: if you happen to have an oscillation in the i.f. when using a glass 6H6 you can replace it with the metal type.

February, page 61, listed a li'l 'ol transistor at 30 amps instead of 30 microamps. Tests indicate that it works better at 30 microamps.

hamfest

Annual Goose Bay Amateur Radio Club QSO Party

Time: Commences 0000 hours GMT 4 April 58 ends 2400 hours GMT 10 April 58.

Bands: All bands and either phone or C.W. or both may be used.

Exchanges: RST, name and QTH.

Awards: A worked all goose (W.A.G.) certificate will be issued free to the following:
All amateurs in Canada and U.S.A. who submit logs showing they have worked five (5) VO2 stations during this period.
All other amateurs who submit logs showing they have worked four (4) VO2 stations during this period. Show date, time and frequency, of QSO's.
Submit logs to Ted Harvey, VO2AB, awards manager, AERADIO, Department of Transport, Goose Bay, Labrador.
No QSL cards are required for these awards as logs can be cross checked locally.

Following VO2 stations will most likely be on during this period.

VO2's AA-AB-AH-AM-EA-GD-HR-IA-NA-RS and UA.

Get your W.A.G. certificate and that missing zone two (2) during this QSO party.

BIG GUN [*from page 57*]

Parasitics?

Five different versions of this amplifier have been built and so far no parasitics have reared their ugly heads. One amplifier was tested at 7500 volts (E-gad! — *Editor*) with complete stability. Of course this does not mean that a written 10,000 mile guarantee is being given that *your* particular amplifier will not have parasitics. Chances are—if you duplicate the parts placement and layout closely—it won't. If, by chance, one does show up, a parasitic supressor placed right at the grid terminal of the tube will do the trick. Try two 50 ohm, 2-watt carbon resistors in parallel, shunted by three turns of #14 wire, wound into a coil ¼-inch long and ½-inch in diameter. That should do the trick. The *Radio Handbook* (published by Editors & Engineers, and available through The *Radio Bookshop, 1379 East 15th St., Brooklyn 30, N. Y.*) has complete information concerning parasitic supression in high power amplifier stages.

Operation on Other Bands

This particular amplifier was designed for 14 mc operation. It is essentially a one-band affair, in that no bandswitching system is used. Both grid and plate coils must be changed for a QSY to another band. Operation on 40 and 80 meters is possible if the grid coil is cut to resonate with the tuning capacitor (C1) nearly fully meshed. Each section of C1 should be padded with a 100 mmfd 2000 volt mica capacitor for 40 meter operation, and with a 200 mmfd capacitor for 80 meter operation. In addition, the capacitance of C2 must be increased to 150 mmfd for 40 meter operation, and to 300 mmfd for 80 meter operation. Additional fixed capacitance must be paralleled across the pi-network loading capacitance (C3) for 40 and 80 meter operation. 15 meter operation is possible if the grid coil is trimmed to resonate with a maximum setting of C1. Coil L2 should be reduced for 15 meter operation. Operation of the amplifier has not been attempted on the 28 mc band. ■

Parts List for Figure 1

C1—150-150 mmf split stator capacitor (Johnson 150FD20)
C2—50 mmf, 13,000 volt capacitor (Johnson 50C130)
C3—500 mmf capacitor (Johnson 500E20)
C4-C9—Coaxial "Hypass" capacitor, 0.1 uf, 600 volts. Bulkhead mounting. (Sprague 80P3)
C10-C12—500 mmf, 10KV, "TV-type" capacitor (Erie 413)
NC—Disc-type neutralizing capacitor (National NC-125)
L1—Grid coil. 50 watt plug-in type, center link (see text)
L2—Plate coil: 6 turns of ¼" copper tubing, 3¼" l.d., 4" long. Adjust coil to resonate with C2 about ¾ meshed
RFC1—2.5 mh. (National R-100)
RFC2—Heavy duty choke. (National R-175) see text
RFC3—20 turns #16e, ⅜" diam., 1" long self supporting
RFC4—2.5 mh. (National R-100U)
R1—Swamping resistor for SSB operation. Non-inductive (see text)
R2—Safety shunt for meter. 100 ohms, 10 watts
R3—100 ohms, 2 watts
T1—Filament transformer. 7.5 volts at 15 amperes (Thordarson 21F17 may be used with 450-TH-12 amperes)
J1, J2—Coaxial receptacles, SO-239 (Amphenol)

Parts List for Figure 3

C1, C3—40 mmfd (Centralab type 850, 5kv)
C2—100 mmf (Centralab 850 5kv)
L1, L5—6 turns #12 E, ½" i.d., ¾" long
L2, L4—8 turns #12 E, ½" i.d., 1" long
L3—1½ turns #12 E, ½" i.d., ⅛" long

Parts List for Figure 4a

CH-1 3 henry at 150 ma (Chicago-Standard C-2309)
T-1 440-0-440 volts at 130 ma (Chicago-Standard P-6143)
Adjust R-1 to provide proper operating bias

Parts List for Figure 4b

CH-1 3 henry at 150 ma (Chicago-Standard C-2309)
T-1 250-0-250 volts at 70 ma (Chicago-Standard PC-8403)
R2, R3—20 ohms, 1 watt
Adjust R-L for current of 35 ma through each regular tube

SURPLUS [*from page 59*]

impossible to obtain this offer would have been appreciated—except that he wanted six-fifty for it. This kind of got us mad. First the idea of six-fifty for a book worth a buck was a wee bit too much. Secondly, we are hams, and especially to the surplus user, extremely interested in keeping the price down. I guess he just forgot this is a hobby.

All of this started us thinking. There is a demand for handbooks, and many of us have handbooks we don't even use anymore. As a result, CQ is commencing a service, via the Surplus column. While we will not directly participate in any transaction, we would be glad to list any handbooks that are needed, and your call. If someone has the particular book he contacts the party directly—*NOT CQ*. From then on the swap is between two subscribers. CQ can take no liability. Just about all we can do is list who needs what book. As it is now, our mail is tremendous, and we couldn't possibly handle the swaps personally.

As a beginning, W6PHU is looking for a conversion of the GO-9/TBW series, while KN9IKY wants the BC-1267A handbook and Rudy Platek, W3OUA is looking for anyone who has any conversion on the RU-19 receivers. W2GZ is looking for any three band conversion of the ARC-5 VHF transmitter.

Let's give these chaps a hand with this info.

73, Ken, W2HDM

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LOW SWR – REMARKABLY FLAT ACROSS BANDS!

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Model **TA-33**

Beautifully constructed 3 element beam for operation on 10, 15 or 20 meters. Forward gain is 8db, front-to-back is 25db, and SWR is 1.5/1. Maximum element length is 28 ft. and weighs only 47 lbs. Boom is just 14 ft.

$99.75

Model **TA-32**

Similar to Model TA-33, but has 2 elements operating on 10, 15 and 20 meters. Forward gain is 5.5db, front-to-back is 20db and SWR is 1.5/1. Featuring a short boom of just 7 ft. and max. element length of 28 ft. Weight is 34 lbs. Converts to Model TA-33.

$69.50

Model **V-4-6**

This low cost, high performance vertical antenna covers all bands from 10 thru 40 meters. Requires little space and may be mounted on ground or roof-top. Low SWR and band switching is automatic. Loading coil available for 80 M.

$27.95

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St. Louis 14, Missouri

For further information, check number 27 on page 126.

SB [*From page 61*]

wending its way thru the smooth inland passage-way to the ocean. Harry maintains a crew of five including a regular licensed captain, and with the stewart catering to their every whim it looked like a fine trip ahead. When the BAR-L-Rick cleared the channel, its 2662 square feet of white billowy sail was set with Nassau twenty hours due East. After the first hour at sea it was noticed that Danny, W2GG/4 a retired USN Commander was operating the rig on 15 meters most of the time and that after three hours at sea he advised that the course was changed 180 degrees. Here was a ship with finer navigational aides than most ocean going steamers, with a cruising range of 2400 miles being returned to port because of "choppy seas". Harry would not mention names to this correspondent but hinted that the healthy tan on some of his guest's faces had changed to a greenish pallor and that they had voted to return to port: Oh well, "put back to port today and be on twenty another day."

Prior to the voyage, Bill, W2KG/W4VEC was host at a dinner to bid bon voyage to the sailors. Among the guests were Butch, KØDWC, Art, WØCXX, W4GL, W4BMR, W4QS, W4ERK, W2MDQ, W4CF, W4FH, and W4HB. A picture is promised for next issue.

We have just learned from Alan, W3ZP that 4X4DK will soon be on SB with an exciter sent to him by VE3MR.

By the time you read this column, at least those in the US, you will probably be getting ready for the Second SB-DX Contest to be held from 1800 GMT March 15 until 1800 GMT March 16th. This one should be terrific, due to the increased activity of SB throughout the world, and the definite advantages of SB over AM for voice-break contacts. It is expected that there will be over 100 countries participating in the contest, and after it is all over there should be many stations with DXCC on SB. Don't forget that the contest will be on all amateur bands, with regular DX Contest multiplier point systems applying. Lets make history in these twenty-four hours of competition.

While on the subject of DX, how many times have we gotten all riled up when, right in the middle of a nice friendly chat with some one around the top end of twenty, some big signal pops on the frequency calling a DX station, without regards for your feelings. Actually the DX station being called is outside of the American phone band, and there was absolutely no time for the station calling him to tune down and check his frequency first. That will always be one of the "hazards" of holding QSOs at the top of the band. It could happen even lower down in the band if the

[*Continued on page 98*]

YOU COULD WORK WONDERS IF YOU HAD A GOTHAM BEAM!

You could work KC4USA in the Antarctica with only 90 watts on 15 meters, as W4SK did.

You could work over 100 countries with a three element 10 meter beam, and be a top man on the frequency, like WØDEI.

You could work terrific skip and DX with reports of 20 over 9, with as little as 36 watts input on 20 meters, as W. E. Woods did.

You could work 29 states in three months on six meters, with low power, as K2LHP did.

NO TRAPS, COILS, BALUNS, STUBS OR INSULATORS USED!

Study these specifications — compare them — and you too will agree, along with thousands of hams, that GOTHAM beams are best!

TYPE OF BEAM. All Gotham beams are of the full half-wave plumber's delight type; i.e., all metal and grounded at the center. No wood, tuning stubs, baluns, coils or any other devices are used.

MORE DX CONTACTS

GAIN. Gotham beams give the maximum gain obtainable. Our 2-element beams give a power gain of four (equivalent to 6 db.); our 3-element beams give a power gain of seven (8.1 db.); and our 4-element beams give a power gain of nine (6.6 db.).

THOUSANDS IN DAILY USE

MATCHING. Matching of the transmission line to the beam is extremely simple and quick. No electronic equipment or measuring devices are required.

ASSEMBLY AND INSTALLATION. No special tools are required for assembly and installation. Entire job can be done by one man in less than an hour. Full instructions are included with each beam.

YOU WILL WORK THE WORLD

STANDARD AND DELUXE BEAMS. Standard beams in the 6, 10 and 15 meter bands use ⅝" and ¾" tubing elements; the deluxe models for these bands use ⅞" and 1". In 20 meter beams, the standard has a single boom, while the deluxe uses twin booms.

TRIBANDER BEAMS — TWO BANDER BEAMS

A full half-wave element is used on each band. No coils, traps, baluns, or stubs are used. No calculations or machining required. Everything comes ready for easy assembly and use. *Proven Gotham Value!*

TECHNICAL CHARACTERISTICS

S.W.R. On Each Band	1:1
Diameter of Elements	⅞" & 1"
Number of Booms	2
Diameter of Booms	1"
Boom Length	12'

6-10-15 Tribander

GAIN	F/B RATIO
6.5db on 6 mtrs	23db on 6 mtrs
7.8db on 10 mtrs	27db on 10 mtrs
6.5db on 15 mtrs	23db on 15 mtrs

10-15-20 Tribander

GAIN	F/B RATIO
6.5db on 10 mtrs	23db on 10 mtrs
7.8db on 15 mtrs	27db on 15 mtrs
6.5db on 20 mtrs	23db on 20 mtrs

All Two-Bander Beams Have A Forward Gain Of 5.8db On Each Band, And A F/G Ratio of 17db.

Two-Bander Beams Available In Following Combinations: 6-10; 10-15; 10-20; and 15-20. See Coupon.

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☐ Std. 3-El Gamma match	12.95	☐ T match	14.95
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20 METER BEAMS

☐ Std. 2-El Gamma match	21.95	☐ T match	24.95
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☐ Std. 3-El Gamma match	34.95	☐ T match	37.95
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(Note: Gamma-match beams use 52 or 72 ohm-coax. T-match beams use 300 ohm line.)

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Each has a TWIN boom, extra heavy beam mount castings, extra hardware and everything needed. Guaranteed high gain, simple installation and all-weather resistant. For 52, 72 or 300 ohm transmission line. Specify which transmission line you will use.

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☐ Beam #R15 (15 Meters, 3-El) 49.95

Name

Address

City ..... *Zone*..... *State*

SB [*From page 96*]

DX station indicates that he will "tune arou 270", but not nearly as frequently as it v between 14290 to 14297. So, when skip long, and you just want to rag-chew with the aggravation of the many interruptions fr DX hounds, why not stay below the top kilocycles?

The USN Icebreaker, USS BURTC ISLAND, with W4VEI, Bob aboard complet its long run from the Arctic to the Antarc and many phone patches are being made fr KC4/land over the one kilowatt SSB rig abo the Burton.

Julian, HK3TG made his debut on SB cently and is very popular on twenty. He H a fine signal on twenty.

Sam, OHØNC is now active from his n QTH on Aland Island. Sam, ex OH2OJ t me the other day that he was not all settl as yet but that the ham gear was all installe He is lucky his XYL is also a ham, OHØN

We are nearing the completion of two yea as Editor of the SB column, and now near twenty-four issues of CQ later, our bigge kick is in receiving all of the wonderful lette from our readers which indicates to us th you are pleased with our efforts. We want do much better, and would like to receive mo photographs and news from you. We acknow edge with thanks information received th month from Mickey, W8YIN, Steffy, W4IY and Doc W6UPP.

73 and see you in the Contest, Bob, W3S

tell them you saw it in CQ

YL [*From page 64*]

of LP albums for her new HiFi set in appreci tion of Kay's furnishing her den as a club me ing place for the last year.

The Georgia Peaches have changed the fr quency of their YL net from 3.985 to 7.26 By moving to 40 meters they'll have bet statewide reception and also allow YLs outsi Georgia to join in the net—or work the gi off net time for their Georgia Peach certifica

Here and There

A card from W4UDQ, Dot Wilson, clear up a mystery (to us). It was Dot who won t portable TV receiver, main prize for the YL at the International YLRL Convention in C cago. . . . W4VCB/3, Ev, holds DXCC and h 119 countries confirmed. . . .

W6QGX, Marryette, YLRL's treasurer, h a happy surprise when a model 80 crystal mi arrived from the Turner Co. complete wi stand. Seems our pix of her in Dec. CQ show Harryette using a Turner mike. With the mo 80 came a note saying, "This is our way saying thank you to all Hams using Turn products." Now don't *all* of you start sending photos showing Turner mikes—hi!

33, Louisa, W5R

LEO I. MEYERSON
W8GFQ

Leo says: *Here's the Nation's Best Deal!*

ON National!

From "The World's Largest Distributor of Amateur Radio Equipment"

$159.50 Amateur Net

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Here's a quality amateur receiver at a popular price. Directly calibrated for the 4 general coverage ranges and 4 bandspread ranges for amateur bands 80 to 10 meters. Also covers 540 kc to 40 mc. Voice or CW. Large, easy to read 11" slide rule dial. Built-in "S" meter on front panel.

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National's low priced general coverage receiver with 4-band coverage 540 kc to 40 mc . . . voice, CW or SSB reception. Bandspread is calibrated for all bands 10 through 80 meters. Separate crystal filter and product detector for CW and SSB. 11" slide rule dial, accessory socket for external adapters, etc. Built-in "S" meter on front panel.

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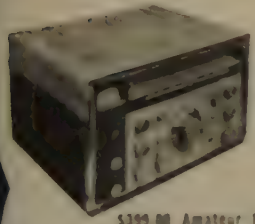

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Excellent stability — top sensitivity. Dual conversion. "Dream Receiver" with more than 50 db primary rejection on all bands; more than 60 db secondary image rejection. 10 dial scales for 160 to 1¼ meter coverage. Extra long slide rule dial. Super selectivity, giant easy to read "S" meter.

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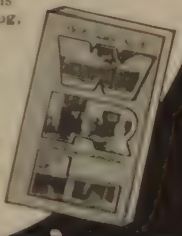

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For further information, check number 23 on page 126.

VISUAL MONITORING [*From page 45*]

pending upon the exciter and linear ampli output.

To prevent phase shift occurring on the sc patterns, the coaxial cable from the dem boxes should be kept even as possible a should some phase shift be present it m be corrected by placing a 500 mmfd m capacitor in series with a 250K potentiomet and connecting these two components in ser with the inner conductor of either coaxial ca from the demod. This connection is made the scope terminals.

The test setup used for taking the followi photographs is simple and can be duplicat as follows. Connection to the scope can made from the last if of the receiver throu a 47 mmfd mica capacitor to the vertical inp of the scope, for indications such as th represented in fig. 5, 6, 7, and 8. Some rece ers are equipped with an AVC amplifier sta and connection to the plate circuit will ca less detuning of the receiver if than connecti directly to the if strip. With either metho indications can be obtained similar to fig. 6, 7, and 8. Fig. 9 shows a simple demodulat using a germanium diode and filter to be co nected to the horizontal amplifier of the scop which is necessary to obtain patterns as in fi 5, and 6. Fig. 7 and 8 are obtained with th internal sweep of the scope.

With proper bias and excitation applie to the linear amplifier a two tone test sign or voice frequencies modulating the excit will produce a forty five degree, straight lin on the escope as shown in fig. 2c, 3c, and 4 Any non-linear condition being generated i the exciter such as overdrive or insufficien loading, will be indicated o nthe scope, an thus a constant check can be made as to th operation of exciter and linear amplifier.

The equipment used in the tests consiste of a 20A exciter driving a JKW linear ampl fier, (page 39, July 1956. CQ), a National re ceiver with sideband slicer, and a Heath Mode OM-2 oscilloscope. The camera used was Polaroid, and all tests were conducted at 28. megacycles.

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73, Bil Harrison, W2AVA

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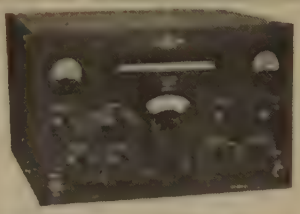

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For further information, check number 31 on page 126.

NEW LOOK [*From page 37*]

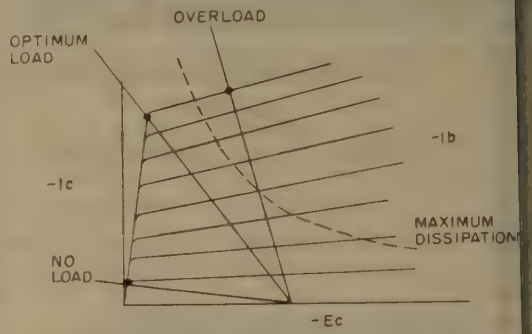


Fig. 4—Typical collector characteristics.

"Switching Transistor" that appeared in the March 1, 1957 issue, and which prompted the investigation leading to the preceding paper.)

Parts List

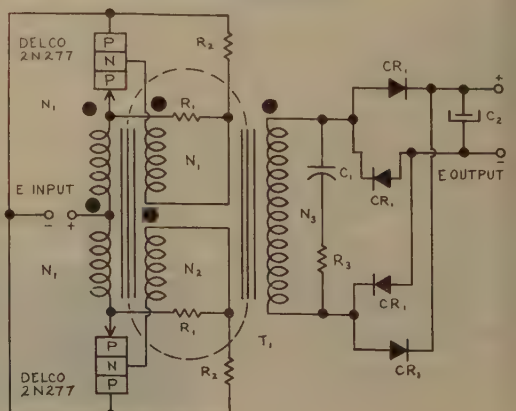
R1—10 Ω 2W
R2—240 Ω ½W
R3—470 Ω 2W
C1—.005 mfd 1600V
C2—12 mfd 450V Electrolytic
CR1—2 Raytheon 1N539 in series, or, 6X4 with both plates tied together, or, a 600 volt 300 ma. silicon rectifier. (Note: CR1 is used in 4 places in a bridge rectifier).

T1—Arnold Engineering Corp. Marengo, Ill. Cat. No. 5778-D1 or equivalent. Cross sectional Area = 1.2 cm^2 (Cost Approx. $8.00)
Turns wound on T1

Winding	*6 Volts Input*	*12 Volts Input*
N1	12 turns No. 16 Enamel	24 turns No. 16 Enamel
N2	15 turns No. 24 Enamel	15 turns No. 24 Enamel
N3	1,000 turns No. 32 Formvar, or Enamel.	1,000 turns No. 32 Formvar, or Enamel.

N1 should be wound with the largest gauge wire that will physically fit on the core. N3 should be wound on the core first and should cover about 320 degrees, in one direction, either clockwise or counterclockwise. A layer of insulation is then placed over N3 to insulate it from both N1 and N2 windings which are wound on last.

Fig. 5—Experimental circuit.



For further information, check number 44 on page 126.

GENERATOR [*From page 41*]

space time elements is introduced at the transmitting loop, and the meter reading at the receive loop recorded. If there is no bias distortion then the time elements are equal at the receive loop also and the meter will vibrate half way between the recorded mark and space values. With the values of 60 ma. mark, and 0 ma. space, the meter should vibrate at 30 ma. If there is marking bias distortion in the equipment the meter will vibrate closer to the recorded mark value, and with spacing bias closer to the recorded space value. For example if the meter vibrates at 35 ma. with the mark and space values mentioned before then there is about 17% marking bias. While the square wave signal is being transmitted any balancing, tuning, or alignment adjustments in the equipment should be made to bring the bias reading to 0% (half way between mark and space values).

The teletype keyboard cannot be used for generating the square wave signal because of the stop pulse which is 42% longer than the other 6 pulses. The square wave generator must be completely free from bias distortion itself and generate a pulse of approximately the same length as the teletype pulse of 22 ms. A binary divider is ideally suited to this application since it is perfectly free of bias distortion. By driving the divider from the 60 cycle A.C. line the output pulses are 17 ms. long which is equivalent to about 75 speed teletype, and adequate for checking 60 speed circuits and equipment.

The circuit of *fig. 1* shows how such a reversal generator, as it is called in teletype, may be constructed. Tube V1a provides negative half cycles to drive the binary divider V2, from the power transformer. The 1000 mmfd capacitors at the grids of V2 differentiate the pulses to spikes to operate V2. V2 then flips back and forth at a thirty cycle rate, producing a square wave which is fed to V1b, the buffer amplifier. The buffer is connected as a cathode follower and drives the keyer tube V3 across the clamping circuit using the IN34. The keyer tube is connected into the transmitting loop circuit in place of the keyboard. The only precaution here is that the polarity of the loop power supply must be positive on the plate of the keyer. A simple power supply is included with the unit to make it self contained.

In operation the unit can be checked by placing a meter in series with the keyer tube. The meter should read half of the full marking current. The reversal generator can also be used in adjusting the keying of CW transmitters by connecting it in place of the key, and monitoring the output of the transmitter with an oscilloscope, while adjusting the keying circuit constants. Synchronization of the oscilloscope sweep is done with the 60 cycle power line. The oscilloscope can also be used with teletype equipment in place of a meter. ■

HALF-GALLON [*From page 29*]

that efficiency falls off. Nothing beats a scope for making sure of good linearity in the amplifier. It has been found that when the 811A's are properly loaded the plate current will be approximately ten times the grid current.

This amplifier is so simple that only a few words are necessary on construction. The input and output circuits should, as in all amplifiers, be well separated from each other. The common practice of mounting the input circuit (in this case the filament circuit), below the chassis and the output circuit above the chassis serves very well. The usual precautions should be taken of making all rf leads (which in this case means almost all leads) as short and heavy as possible. It is recommended that those leads which are not designed to carry rf be shielded and that the power leads entering the chassis be by-passed.

The plate supply, as for all Class B amplifiers, should have good regulation. A good practice is to put as much capacity in the output side of the power supply filter as you can dig up. You can never get too much. The only limiting factor is your ability to pay and pay for high-voltage capacitors.

Up to approximately 1300 volts on the plates no bias will be required. If it is desired to run 1500 volts on the plates, an inexpensive 4.5-volt C battery in between the grids and ground will give practically shelf life.

The photos show how simple and compact such an amplifier can be made. The unit shown, one of several constructed, was made entirely from junk-box parts. This includes the 5" by 7" by 2" chassis, as the unused holes will testify. By using a larger chassis, a band-switching pi-net output circuit may be used in place of the plug-in arrangement shown. Also a third 811A might be added, providing the filament supply will handle it. The filament choke, rated at 15 amps, will easily handle three 811A's. Three tubes will lower the input impedance and thus give a closer match to the 50-ohm output of most commercial exciters. Also the total plate dissipation rating will be increased, permitting inputs of up to about 600 watts for SSB, DSB, and CW. ■

Parts List

C1, C2, C3, C4—.01 mfd, 400-volt disk ceramic.
C5, C6—.001 mfd, 5000-volt.
C7—300 mfd variable, 0.1 inch spacing.
R1, R2—7 turns No. 18 enamel wire wound on and connected in parallel with 47-ohm, 2-watt resistor.
RFC1—B&W FC-15 filament choke.
RFC2—2.5 mh 500 ma. or better.
L1—See Table I.

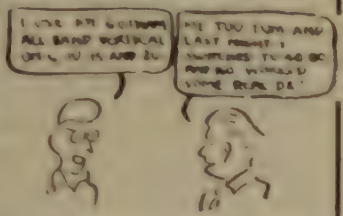
Table I

Mc.	C-7 (uufd.)	L-1 (uh.)
3.8	275	6.3
7	130	3.7
14	65	1.9
21	50	1.1
28	32	.9

Approximate values of C and L based on a plate voltage of 1250, plate current of 350 ma., and Q of 12.

"I am now using the Gotham V80 vertical antenna with only 55 watts, and I am getting fantastic reports from all over the world". VP1SD

ALL-BAND VERTICAL ANTENNAS



GOTHAM'S sensational new vertical antennas give unsurpassed multi-band performance. Each antenna can be assembled in less than two minutes, and requires no special tools or electronic equipment. In the V160, resonance in the 160, 80, 75, and 40 meter bands is secured through use of the proper portion of the loading coil. Yet, when the coil is eliminated or bypassed, the V160 will operate on 20, 15, 10 and 6 meters! The same idea applies to our V80 and V40 multi-band verticals. No guy wires needed; rugged, occupies little space, proven and tested.

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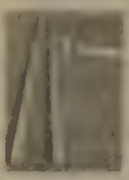

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GOTHAM 1805 PURDY AVENUE MIAMI BEACH 39, FLA

PUBLICITY [*From page 35*]

be a bit interested in a local man getting 'phone WAZ, unless you tell him what these things mean.

The quart of blood price goes also for adjectives. If you describe the work of a ham in an emergency situation as heroic, that is editorializing, a capital sin, and definitely *verboten*. Tell the reader what the ham did and all pertinent circumstances, and let him decide whether or not it is a case of heroism.

3. Form: Here also you can increase your chances of being printed. All material must be typewritten. Even Mr. Palmer of Palmer Method fame could not expect handwritten copy to be accepted. Triple spacing or at least double spacing should be used. Leave generous margins (left 2 inches, right 1 inch).

The story begins about halfway down the first page to leave space for a headline to be written. Never allow a sentence to run over to the next page. Even a paragraph should not do so. Remember to number the pages. Use 8½" x 11" paper, by the way.

4. Photographs: Because it costs a bit to make an engraving for a picture, and because amateur photos usually lack quality, very few pictures are used in the free story. However, a good photo has a chance. Photos should be at least 5" x 7", but 8" x 10" is the preferred size.

All persons in the picture should be identified. All other pertinent information is included with the identification and pasted to the back of the photo.

5. Etc. Newspapers print such free material when and where they have space to fill. Generally speaking the hardest paper to try to make is the Saturday edition, since it is so small. The Monday paper is probably the easiest, because not enough happens on Sunday to fill it. Find out from the city editor when the deadlines are. Always have your material in well ahead of a deadline. It is advisable to bring your story in yourself in order to answer any questions the editor might have.

If your paper does outside printing work, you can create good will by having them print your dance tickets, hamfest programs, club stationery, etc.

Who am I to Tell You?

I offer the above advice from experience and from training received at a graduate school of Journalism. It summarizes what I have learned as it might be applied to a ham club looking to gain some free (no $$) publicity.

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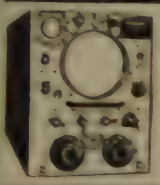

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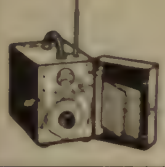
Type	Each	Type	Each	Type	Each
RK65	$7.25	815	$2.90	2X2	$.89
2C42	4.95	826	.44	6A7	.35
2C46	3.50	829B	7.50	6AG5	.33
2J724B	.35	832A	5.95	6J6	.33
VR105	.79	837	1.15	12SA7	.34
VR150	.79	1625	.20	12SQ7	.33
717A	.29	1626	.21	35Z5	.33
CRP-736A	4.50	1629	.27	50L6	.33
813	6.95				

NEW! Cathode Ray Tubes NEW!

3CP1	$ [illegible]	5CP1	$2.45
3FP7	[illegible]	5FP7	1.44
3BP1	[illegible]	5JP7	1.85



BC-906 FREQ. METER—SPECIAL!

Cavity type, 145 to 285 Mc BRAND NEW, complete with antenna. Manual incl

[illegible] Case
Pkg. [illegible]

$9.99

SCR-274 COMMAND EQUIPMENT

ALL COMPLETE WITH TUBES Type	Description	Excellent Used	Brand NEW
BC-453	Receiver 190-550 KC	$14.95	$18.95
BC-454	Receiver 3-6 Mc	9.95	12.95
BC-455	Receiver 6-9 Mc	9.95	13.50
BC-457	TRANSMITTER 4-5.3 Mc complete with all tubes and crystal. BRAND NEW		$7.88
BC-458	TRANSMITTER 5.3 to 7 Mc complete with all tubes and crystal. BRAND NEW		$7.88
BC-459	TRANSMITTER 7.9-1 M [illegible] all tubes and crystal BRAND NEW		$11.95
ARC-5/T-19	TRANSMITTER—3 to 4 M. BRAND NEW complete with all tubes & crystal		$8.88

110 VOLT AC POWER SUPPLY KIT

For All 274-N and ARC-5 Receivers

Can be assembled quickly and easily, on pre-drilled chassis. Plugs into the rear of any model 274-N receiver and delivers 24 volts as well as "B" voltage. Complete kit of parts with metal case. Instructions
Factory wired, tested, ready to operate

$7.95

SPLINED TUNING KNOB for 274-N and ARC-5 RECEIVERS. Fits BC-453, BC-454 and others. Only **59c**

DYNAMIC HANDMIKE with "Press-to-talk" Switch, cord & plug—BRAND NEW, only $2.95

DYNAMIC HEADPHONES, [illegible] impedance, with [illegible] phone cushions, cord, phone plug. BRAND NEW $3.95

WESTON 40-0-40 Microamp Panel Meter, 3" round [illegible] zero center. BRAND NEW including rectifier and resistors [illegible] work for AC, extremely sensitive $4.45

WESTINGHOUSE 2½" round Panel Meter —10 to +4 DB. BRAND NEW $2.95

NAVY "HANDY-TALKY" TRANSCEIVER

Two way communication by voice or MCW up to 20 miles. Xtal controlled transmitter 140-58 Mc Superregen Receiver Telescopic Antenna. Press-to-Talk Switch. Overall [illegible] x 2¾" diam. Our low price, less batteries, each **$22.50**

BC-357 RADIO BEACON RECEIVER—62 to 80 Mc. radio controlled, has 10,000 ohm plate relay, works on 24 V. AC @ 5 A and 220 V DC @ 20 Ma. Fine for remote control, garage door opener, etc. BRAND NEW, WITH TUBES $4.45

SCR-522 2-METER RIG!

Terrific buy! VHF Transmitter-receiver, 100-156 Mc. 4 channels. Xtal-controlled. Amplitude modulated voice. They're going fast! Excellent condition.

SCR-522 Transmitter-Receiver, complete with all 18 tubes, top rack and metal case.

COMBINATION ..... Special **$33.33**

Receiver only, with all tubes	$19.50
Transmitter only, with all tubes	$22.25
Shock mount for above	$ 2.45
Accessories for above available	

BC-929 3" SCOPE INDICATOR COMPLETE

Originally used for IFF and Radar Navigation. Can be easily converted for general bench service work. Tubes included: 2-6SN7, 2-6H6, 1-6X5, 1-6G6, 1-2X2 and 3BP1 Cathode Ray Tube. A TERRIFIC BUY at our low price! Excellent used **$12.95**

As Above, BRAND NEW $14.95

Conversion instructions for AC operation ..... .65

INTERPHONE AMPLIFIER

Type BC 347C. Fully wired, ready to operate! Uses 6F8G tube. Housed in metal container 5¾"x3¾"x2¾" high. A SPECIAL VALUE at our low price **$3.45**

234-258 MC RECEIVER

AN/ARR-2

BRAND NEW 11-tube UHF Tunable Receiver with schematic. Only a few at this low price! Complete with tubes **$9.99**

With 28V 1.6A Dynamotor, complete $12.98

110 VOLT AC POWER SUPPLY KIT for above $9.75

BC-659 TRANSMITTER & RECEIVER

27 to 38.9 Mc F.M. Two preselected channels crystal controlled 5 to 10 watts. Complete with speaker, tubes. Excellent Used **$11.95**

POWER SUPPLY for above, 117 V 60 cy AC $16.95

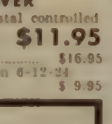
VIBRATOR POWER SUPPLY for above, works on 6-12-24 V DC ..... $ 9.95

GOLD PLATED SPECIAL! TS-1/ARR-1 TEST OSCILLATOR

Portable, complete with two 955 tubes cavity and [illegible] BRAND NEW in metal housing 3⅝"x6⅜" [illegible] high. OUR LOW PRICE, each **$3.95**

FL-5 FILTER 79c

BC-442 ANTENNA RELAY



Wonderful Value! Consists of ¾ amp 2" RF Ammeter (antenna current indicator). 0-10 scale. Transmitter Receiver Switching relay, in aluminum case with associated components. BRAND NEW **$2.49**

SCHEMATIC DIAGRAMS

For any equipment on this page, each **65c**

Please include 25% Deposit with order—Balance C.O.D. 50c HANDLING CHARGE on Orders under $5.00 MINIMUM. All Shipments F.O.B. Our Warehouse N.Y.C.

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53 Vesey St., New York 7, N. Y.

For further information, check number 43 on page 126.

PROPAGATION [*From page 74*]

ospheric behavior, especially during radio blackouts and magnetic storms. The results of these experiments confirmed theories that radio blackouts occur as a result of abnormally high absorption in the dense, lowest layer of the ionosphere, the D-region. Rocket investigation disclosed that this region begins about 40 miles above the surface of the earth. Of perhaps even greater significance, rocket data shows that the ionosphere above the D-layer may remain more or less undisturbed during a blackout, contrary to previous theory which supposed that the reflecting layers became diffused, or disappeared entirely during a radio blackout.

The absorption present in the D- region during a radio disturbance had previously been thought to occur as a result of ultra-violet and other type radiation from the sun. In another recent IGY rocket experiment, however, it was ascertained for the first time that solar X-rays, emitted from the sun during solar flare outbursts, were responsible for increasing absorption in this region during blackouts.

New information about the farthest reaches of the atmosphere is also being obtained from the study of *whistlers*, whistle-like sounds which can be received at very low radio frequencies. These signals, believed to originate in lightening flashes at the surface of the earth, are thought to be propagated high in the atmosphere for thousands of miles along the earth's lines of magnetic force, returning to earth at the opposite end of the world from where they originated. IGY experiments with whistlers indicate that ionization of the earth's upper atmosphere may extend far beyond presently supposed heights, and that there may actually be a very thin atmosphere filling all the space between the earth and the sun.

While the report of the US-IGY Committee dealt primarily with progress U.S. scientists have made during the first five months of the IGY, it closed with the statement that data from nearly all of the 67 participating nations was beginning to flow into the three World Data Centers, in the US, the USSR, and in Western Europe and the Pacific. The data is expected to reach a peak early in 1958.

Scientific frontiers have been pushed forward significantly during the first five months of the International Geophysical Year. There is the promise of even more startling discoveries during the remainder of the IGY (which ends December 31, 1958) as thousands of scientists throughout the world unite in unprecedented studies of the earth, and the world about us.

Eighth Year

This begins my eighth year as Propagation Editor of CQ. With deep gratitude I want to thank all of you who, during the past seven years have helped in making this the most popular column in *CQ Magazine*.

73, George, W3ASK

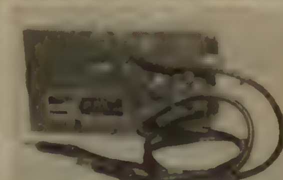
PHONE PATCH TRANS.
No. C-161
$1.95

RANGE BEAM FILTER

... rejection W/ PL-55 Plug & Cord for plug ging into Rec. Two out put jacks. New $1.95
FL-8 Filter. Used $1.50
FL-5 Filter $1.00

SIDE BAND LOADING COIL
No. C-114
$1.95

TELEPHONE & CONTROL EQUIPMENT

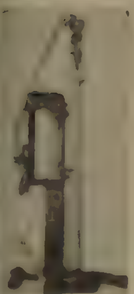


CONTROL UNIT RM-53 - Used to operate radio equipment and provide remote control and intercom. of such equipment by use of the RM-52 Unit ... flashlight batt. Internal transformer has High-Low Impedance Sw. and Sidetone. Also Mic. & Phone Jack & PL-55 & PL-68 Plugs. Used. $2.95 New $4.95

REMOTE CONTROL RM-52 Can be used with RM-53 or used as a separate telephone system. Uses 4 flashlight batt. Also can be used as a direct remote control for radio equipment. Provides bias for Mic & ... High or Low imp. Mic. & Phone Jacks. Can be used also as a Phone Patch Unit. Used $1.95
New: $2.95

TS-13 HANDSET for RM-53 or RM-52 ... Used. $3.95

RADAR TRANS.



Transmitter Frequency 145 to 194 MC. using one 3A5 Tube in plastic case 4½" x 1½" ... Telescoping Antenna with 16" Dipole. Battery Case for holding 2/BA-38 ... & BA ... Tel. Ant. mounts side of batt. case.
Price **$2.95**

AMPLIFIER

Using 2 6V6 Tubes, Carbon Mic input and tapped output Transformer ... for signaling. With ... less Dynamotor RC-... 12 Volt less Case. New $1...; RC 687 24 Volt, with Case. New $2.95

MISCELLANEOUS:
BC-191 TRANS. 100 Watt. Used $24.95. New $29.95.
PANORAMIC ADAPTER — ... Used $34.95.

GASOLINE ENGINE GENERATOR

... MA & 14.6 VDC 25 Amp. Control Box has starting switch ammeter ... transmitter standby and low voltage can be used for charging batteries ... tools. Shipping Wt. 200 lbs. F.o.B. ... No. PE-49 $79.50

25—40 WATT TRANSMITTER FOUNDATION UNIT

Plug in Oscillator Unit as used in ... Trans. Foundation. Contains Variable Cond., 1/140 MMFD. ... Crystal holder, switch, knob, etc. TU-48 2.5—3.2 MC, TU-49 3.2—4 MC ... Each ... **$2.95**

FM RECEIVERS & TRANSMITTERS
20 TO 38.9 MC And 150 TO 172 MC

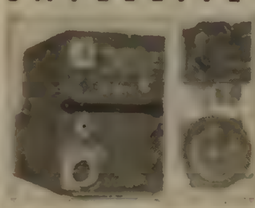
TRANS REC ... less Crystal. Both units on a common chassis. Trans. 30 Watt— ... Mic. & Antenna. Used, Checked. Raytheon ... $59.50

152—162 MC FM RECEIVER & TRANSMITTER:

Link Receiver—1905A—less Tubes & Power Supply—Used	$18.95
Link Receiver ...	$24.95
Link Transmitter—1906A—less Tubes & Power Supply—U	$14.95
Link Transmitter—1906 ... Tubes with Power Sup.—U	$19.95
... FM RECEIVER ...	[illegible]
BC-683 FM RECEIVER 27-39.9 MC Used	$24.95
BC-604 TRANS.-FM 20 to 27.9 MC—Used $14.95—New	$19.95
BC-924 TRANS.-FM 27 to 39.1 MC—Used $14.95—New	$19.95
BC-620 TRANS.-RECEIVER FM 20 to 27.9 MC Used	$14.95
BC-659 TRANS.-RECEIVER FM 27.9 to 39.1 MC Used	$19.95
6 or 12 VDC Power Supply for BC-620 or BC-659. U.	$ 9.95
N.	$ [illegible]

SCR-522 REC TRANS AM 100-156 MC, complete with tubes—Used $29.95
Receiver Only—less shifters. With Tubes $14.95 Less Tubes $7.95 Trans. Only—less shifters. With Tubes $18.95 Less Tubes ...

SATELLITE RECEIVER



... Receiver is AM and Crystal Controlled Six pre-set frequencies in the 108.5 to 110.5 MC range. Provides audio and band pass filter output of 90 & 150 cycles for aircraft instrument landing for which it was originally used. Complete with Ten Tubes ... 12SR7, 1/12SQ7, 3/717, 1 ... Voltage required: 12 or 24 VDC & 220 VDC 80 MA. Size ... Can be converted to FM Receiver 80 to 108MC
Used, less tubes & crystals: $4.95—New, Complete with Tubes $12.95
... Box New $2.00 Cross Point Indicators, Used $2.00 ... $1.00 ...

TRANSMITTER

Crystal Control — 3.5 to 4 MC, 50 Watts. MO—PA for CW. With Automatic Keyer Motor and Code Wheels. 2/1625 & 1/25LG ... tion book & Conversion ... New **$5.95**

RADAR OSCILLOSCOPE

Control Indicator with 25 Tubes, consisting of: 12/6SN7, 5/6SL7, 7/6V6, & 1/5CP1. All Controls on front panel, such as horizontal, vertical ... output circuits, etc. Voltage required 2400 VDC 300 VDC & 6.3 V. Size 24" L. x 20" D. x 10½" H. Complete with tubes and circuit diagram ... NEW **$14.95**

TRANSFORMERS And CHOKES:

1060 VCT/190 MA 6.3 1.2; 6.3 3.6; 5V/4	$4.95
600 VCT/100 MA 6.3 3A; 5/3A	3.95
240 VCT/35 MA 24 .9A; 6.3 .6; 6.3/2	1.75
... VCT 260 MA ...	7.95
700 VCT 150 MA 6.3 4.5A; 5V/3A	3.95
1800 VCT 12.6 MA Tapped 2.5V/2A	3.95
1100 VCT 80 MA ...	3.95
350 VCT/70 MA—6.3V/2.1A; 5V/3A	2.95
24 Volt ... Amp $14.95 ... CT ... Amp	5.95
5V/2 Amp 3 windings: 5V/6A	2.95

TRANSFORMERS FOR SURPLUS EQUIPMENT:

1200 VCT/200 MA—12.5/2A; 12.5/2A; 5V/3A H-108	$8.95
500 VCT/50 MA 24V 1A, 6.3V 1A H-1..	4.95
500 VCT/80 MA 24V 2A 5V 3A H-110	4.95
12.6 2 Amp $1.95 24V ... Amp	1.95
Dual Winding 12V 4 Amp or 24V 2 Amp	5.95
CHOKE 12.5 HY/100 MA	1.95
CHOKE 10 HY/250 MA	4.95
CHOKE 8 HY/150 MA 200 ohm Open Frame	1.25
CHOKE 5 HY/150 MA 85 ohm	1.50

HIGH FREQ. RECEIVER

53 to 88 MC — For ... controlled ... tems on ... ed fixed ... Complete with 6 Tubes: ... 1/6J5, and 24 Volt Dynamotor New. $6.95

OSCILLATOR TS-385
Crystal ... 6J5, 6V6, 6A6, & ... KC Crystal w/Schematic. Used $ 9.95 New: $12.95

SEND TODAY FOR FREE CATALOG

6 VDC DYNAMOTORS:

640 VDC—260 MA—Reconditioned by G.E.	$12.95
... VDC—... MA—Reconditioned by G.E.	9.95

12 VDC DYNAMOTORS:

	NEW:	USED
... VDC—... MA—DM-35	$14.95	$11.95
500 VDC—... MA—DA-12	14.95	11.95
... VDC—... MA—...	12.95	9.95
225 VDC—100 MA—D-402	8.95	5.95
... VDC— ... MA—DM-21	5.95	2.95
230 VDC— 90 MA—PE-133	4.95	
150 VDC—100 MA—DM-310X		2.95
250 VDC— 60 MA—DM-32-12V	4.95	
... VDC— ... MA—DM-...	4.95	2.95
... VDC— 50 MA—...	4.95	3.95
... VDC ...	4.95	3.95
... VDC ... MA—CTR-...	5.95	4.95
... VDC— ... MA—DM-...		5.95
275 VDC—150 MA—DM-64	8.95	

Write us your needs in other type Dynamotors, Inverters, etc.

ADDRESS DEPT. CQ • MINIMUM ORDER $5.00 • PRICES F.O.B. LIMA, OHIO • 25% ON C.O.D. ORDERS

FAIR RADIO SALES
132 SOUTH MAIN ST.
LIMA, OHIO

For further information, check number 46 on page 126.

HAM CLINIC [*From page 67*]

one help him?

Question of the Month

W. F. from Germany writes the following: "I live next door to a dentist and when he uses his X-ray machine it busts up my QSOs. What can I do? How is it done in America?"

Not too much Walter. If the interference is conducted, i.e., is carried over a common electrical system, brute force filters may help, but these must be installed right at the X-ray machine. If it is radiated interference only a complete shielding of the room (office) will suffice. However, there have been cases where portable metal shields (well grounded) have been used successfully to reduce radio interference.

In America, most X-ray machines contain suppression components and are carefully shielded. However, few radio receivers will operate well when they are close to the equipment and it itself is operating.

Perhaps your antenna is too close and could be moved. Have you thought of that?

Suggestions from CQ readers will be appreciated.

Book Review

During the last 15 years I have studied 5 languages and get a great kick out of talking to a foreign ham who speaks one of them. But little did I realize how much I did not know until I received a copy of the HAM'S INTERPRETER, available through the CQ bookstore.

For $1.50 this book which makes 7 languages (French, Spanish, Swedish, Italian, German, Finnish and English) easy to understand, not only covers operating procedures but many technical terms as well.

A "natural" for the DX man, it is easy to use and should be on the operating table of every ham.

Most foreign hams can speak more than one language; most American hams cannot. By using this book, we can show the rest of the world that we are interested in other peoples and their languages and really contribute to better International understanding.

Nous lisons lentement notre livre! C'est pour vous aussi!

Thirty

We enjoy receiving your many fine letters and are sorry that we do not have enough space to acknowledge publicly each and every one. However, we want you to know that we appreciate your encouragement and often, your kind assistance.

Next month we hope to devote the greater part of the column to questions which we feel are of interest to the majority.

Most of our spare time is taken answering questions but we have a deep satisfaction in knowing we are helping others with their problems.

So until next month.

73, Chuck, W6QLV

TTY [*From page 81*]

We were also asked to pass along the word to :ware of "package" deals that include tape quipment, especially a Model 26 with "Model 4 transmitter distributor." Real, live, Model 4 TD's are scarcer than hens' teeth these days, nd when one changes hands, the amount is enerally *twice* that for the "package" deal. *aveat Emptor!*

15 and 20 Meters

RTTY activity on 15 and 20 has increased emendously lately, and with plenty of "big uns," too. The DX-minded boys are having a eld day with such tid-bits as KA8RA, Misawa, apan, and KR6AK on Okinawa (21,090 kc) s well as KL7OOT, Point Bullen, on the Arctic oast of Alaska.

K2AAA, in Bayside, Long Island, is on both 5 and 20 with Kleinschmidt machines (includ-ng tape), and has been scheduling KL7OOT nd Captain Kurt Karlsen, who has a machine board the *Flying Enterprise II*, but no fsk as et, so the contacts are RTTY and SB combined. lost operation is on 21,095 kc around 2000 SI and on 14,320 kc around 2100 and 2300 SI. Traffic is always handled upon request.

W6CG in Temple City, California, needs nly Europe for WAC-RTTY. (Isn't *anyone* on TTY in Europe?) WØBP and W3PYW have lso been on 21,095 kc. BeeP suggests that R6AK hold up his QSL to W6CG until 6OWQ (XYL of W6CG) works him!

W6KUY/MM (maritime mobile) aboard he S.S. Pacific Transport was worked by WØBP hile at the dock at Stockton and right up until uling time from San Francisco. This was on a Vednesday. On Thursday Bud reported that he as 300 miles out in very heavy seas and high inds. Friday he was out 600 miles in heavy wells with a pitch and roll that bothered his arriage returns (new kind of QRM), but his ntennas stayed up. Schedule time is 1930 CST n 21,090 kc and visitors are welcome.

A new RTTY DX station is KR6JL, also orked by DØBP. (I don't think BeeP ever oes to bed!) Jay is W5ORH from Oklahoma ity. Until he got in a three way with BeeP and R6AK, Jay had never met Cas!

Some of the eight operators at KA8RA are V9QMU, W6UMB, W1IHZ, and WØKGH. he most consistent land-line printing comes rom this powerful station in Asia.

40-Meters

The "Forty RTTY Net" meets at 2 pm CST very Sunday on 7140 kc. The NCS is WØBP. *Again?* Ed.) Participation is very good, with 4 stations in 9 states checking in January 5th, or example. One object of this net is to handle essage traffic. Page 48 in the November 1957 sue of *QST* gives all you need to know of the diments of the standard message form.

KL7OOT has also been active on 40-meters, orking W6MTJ among others. He is looking or contacts with St. Louis.

[*Continued on next page*]

RTTY [*From preceding page*]

Keyboard Procedure

Almost all Model 26 machines used RTTYers have a function that we more or l take for granted exists on all machines. This the automatic *unshift-on-space* function. other words, if we have been sending a stri of numbers and we hit the space bar, the m chine goes back to "letters" without the nece sity of hitting the LTRS key. This is fine— both stations in a QSO are using Model 26 If one should have a Model 12 or a Klei schmidt: confusion. If you have a Model you have a choice. A lever in the deep confin of this printer will permit you to have that fun tion or not to have it. (See page 24 of t *RTTY Handbook.*)

Now, if everyone uses the proper keyboa procedure, it won't make any difference wh kind of machine you use. Just get in the ope ating habit with these rules:

1—Depress the "figures" (FIGS) key shift the carriage from lower to upp case *and when spacing between groups upper case characters.*

2—Depress the "letters" (LTRS) key to shi the carriage from upper to lower case.

3—Depress the "carriage return" (CAR RET key to reset to the left margin of th paper. Always use *two* CAR RET fun tions to insure ample carriage retur travel time as this may vary in machine

4—Depress the "line feed" (LINE FEED key to advance the paper one line.

So, in a normal QSO, when you reach th end of a line, hit the CAR RET key twice, th LINE FEED once, and the LTRS once. If QR is high and the signals are weak, hitting th LTRS key twice is a good idea.

Comments

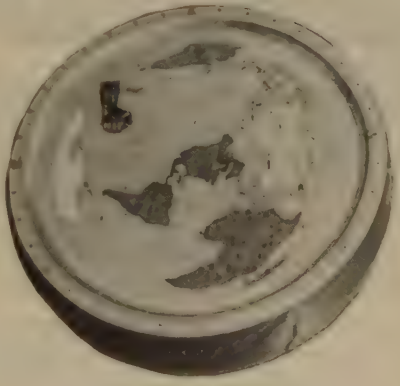
Don't forget the "Narrow-Shift Party" th week-end of March 14, 15, and 16. The sug gested value of narrow-shift is 170-cycles. I you would like further details, contact or writ Boyd Phelps, WØBP, 4232 Scott Terrace, Min neapolis 16, Minnesota.

73, Byron, W2JT

New Amateur Equipment:

Brake-Rotator-Indicator

Hy-Gain Antenna Products has added a powerful rotator and direction indicating system to their famous Roto-Brake. This unit is designed to mount inside a regular steel tower (such as Rohn, E-Z Way, or Televue) and comes complete with mounting brackets for towers of this size. The Brake will rotate almost anything you can afford to put up in the air, and keep the wind from doing same.



The small control box for the rotator mounts under the operating table. A 16" great circle map indicator mounts on the wall and indicates by a moving wedge of light the direction of your antenna. Maps are available for East, Mid-West and West coast as well as compass roses for use in other areas of the world.

The rotating assembly is made up of twin 3600 rpm motors, giving 500 inch pounds of rotating power. Double twin motor units are available for $40 extra for use in places with extremely high winds and extra large antenna assemblies. The price on the whole works . . . rotator, brake, indicator, and control unit is only $139.95. Quite a package, eh? Circle 58 on page 126 for full info on this.

For further information, check number 58 on page 126.

VHF SSB *[from page 31]*

with a signal at 36 mc to produce a signal 50 mc, or with a 130 mc to produce 144 m You then amplify it to the desired power leve It's really just that simple!

Some fellows have used the old surplus 52 transmitters together with their "low fr quency" exciters to get on 2 meters. How Tune the rig up, right up to the grid of th final, to operate on 130 mc. Tune the PA tan circuit to 144 mc. Insert a tuned circuit fo 14 mc in the screen grid circuit and couple to a 14 mc SSB signal source. The result? SS output on 130 mc plus 14 mc or 144 mc. Th final tube is doing duty as a "mixer" to heterc dyne the signal.

To further illustrate how simple it is to d this heterodyning to VHF, I'll touch lightl the parts of my 2 meter SSB transmitter afte I've generated the signal and gotten it up t 14 mc. I like to use low power levels in all o my exciters to hold down TVI potentials, etc This pays off. To get the 14 mc signal to 14 mc, I hetrodyne it with a crystal controlle signal at 130 mc. The 130 mc is furnished b 2 each 12AT7 tubes to produce the 16th har monic of an 8100 kc crystal. These are con ventional oscillator/multiplier circuits. The mixer tube is a 6J6 with only 200 volts on it I feed 10 volts of 130 mc energy into the cathode of the 6J6 and 1 volt of the 14 m SSB signal into one of the 6J6 grids. The othe grid is grounded. The plates work in a conven tional push-pull circuit tuned to 144 mc. The result is SSB on 144 mc. Sure the signal i weak, but you need only signal voltage, no power, to drive a linear amplifier. The outpu of the 6J6 mixer is link coupled to a 6CL Class A amplifier with 275 volts on the plate That drives a 6360 amplifier which loafs alon with 275 volts on it and a no-signal plate cur rent of 35 ma rising to 60 ma on voice peaks OK, so now I have a couple of watts on 14 mc. What next? The 6360 drives a pair o 4-125A's working in class AB2. It is capabl of driving them to a full kilowatt! My powe supply holds me down to the 500 watt region

Any type of SSB signal generator can b used for VHF operation simply by hetrodyn ing its output to the desired frequency an amplifying that signal to the desired powe level. The ARRL and CQ SSB Handbook ex plain how to do this for the lower bands. Th only difference for VHF is to use tubes an circuit layouts that perform well on VHF.

I'd like to cover one final point—that o stability. Since you do not multiply the fre quency of the SSB signal, you don't creat multiplied instability as is the case in many o today's VHF transmitters. The only frequenc multiplied is the hetrodyne signal. How abou using VFO's? SSB is a "natural" for this sinc you can feed the VFO in at a low frequenc and do not have to multiply its frequency. M

[Continued on page 118]

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For further information, check number 52 on page 126.

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VHF SSB [*from page 116*]

2 meter rig generates the SSB at 447 kc using half lattice crystal filters. I hetrodyne the 447 kc signal to 6.1 mc by beating it against a 9002 crystal controlled oscillator. The 6.1 mc SSB signal is then heterodyned to 14.7 mc by beating it against the signal from a 12AT7 crystal controlled oscillator on 8.6 mc. I replaced the 8.6 mc crystal oscillator with a VFO. The result is the same except that I can vary the output around 14.7 mc by swinging the VFO. Since that signal is hetrodyned to 144 mc, I now have VFO operation on 2 meters with the same stability as my VFO has at its frequency of 8.6 mc. Thus I have better stability on 144 mc SSB with my VFO than many fellows have with crystal controlled AM or CW rigs where they multiply both the crystal frequency and the drift.

This trick suggests one that could well be stolen from SSB for either AM or CW operation on VHF. Instead of trying to build a VFO stable enough to permit multiplying its frequency, why not a heterodyne VFO with, say, a clapp oscillator running at 10 mc heterodyned against a 40 mc crystal controlled signal to produce 50 mc output, etc. Such an approach would eliminate the big problem of unstable VFO's. It would be a very desirable feature to include within new transmitters as the basic exciter. ■

DO-IT-YOURSELF [*From page 50*]

volts with audio gain off. If there is insufficient drive to the 6AG7 it will be necessary to experiment with the mixer tank coil as it is very critical and should be of high "Q". This is even more important on the higher frequencies. Check to see that the leads going down inside the coil form do not cross or the output will be reduced.

Now if you have decided to stick to 80 meter operation this is a good time to stop and hang on a W6GEG* type grounded grid amplifier. You will now be on SSB.

40 and 20 Meters

If you want to continue on and have a three band job, the buffer shown in the schematic (fig. 4) can be added. The tank circuits here are also important and use the same type of slug tuned coils. The third harmonic of the vfo is used for 40 meters (16.2 mc) and the buffer tank for this band is swamped with a resistor to provide uniform output over the whole band. On 20 meters the buffer tank is tuned to 5 mc and swamped to even the output over the band. This is a critical circuit and should be capable of turning out the second harmonic of the vfo at 10 mc. Some experimentation may be necessary to get the swamping resistor just right. A 15.5 mc trap must be added to the plate of the 6BA7 to trap the vfo third harmonic. As mentioned previously, the mixer tank coil is probably the most critical part of getting full output on 20 meters. The Q of the coil must be just right to get enough output to drive the 6AG7. This can be checked by using the rf probe on the grid of the 6AG7 and varying the spacing and number of turns of the coils until there is enough drive. To tune the 15.5 mc trap, set the band switches for 14 mc operation, remove the 9 mc crystal from its socket and tune for *minimum* rf voltage at the grid of the 6AG7 amplifier. After the 15.5 mc trap is tuned, reinsert the 9 mc crystal and tune the 20 meter mixer tank circuit for maximum rf voltage.

As indicated in the photograph, a copper shield is placed across the socket of the 6AG7 to isolate the grid and plate circuits. The switch in series with the output meter is used to open the circuit when operating on 20 meters to get more output. The output meter is invaluable when balancing the carrier out, but will load the output circuit somewhat and isn't necessary after the exciter is tuned up.

The 27 ohm resistor across the loudspeaker terminals on the rear of the chassis is for the purpose of keeping a load on the receiver output transformer, thereby preventing damage when the speaker is switched off by the VOX control. The relay terminals disconnect the loud speaker and key the exciter. The author used the TR switch for antenna changeover as described in "CQ" October, 1955, by W9TRG.

*CQ, Feb., 1956 "Something For Almost Nothing," Norman R. McLaughlin. CQ, Sept., 1957 "Economy Power Supply For W6GEG's Final," E. H. Marriner.